RECEIVED
JUL 1 1
VET. MED. LIBRARY

OHIO STATE
UNIVERSITY
JUL 8 1958
LIBRARY

THE JOURNAL OF THE BRITISH VETERINARY ASSOCIATION

The Veterinary Record

PATRON: HER MAJESTY THE QUEEN

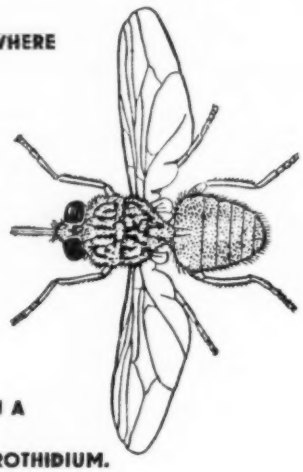
Vol. 70 No. 25 Issue No. 4185 503-522

June 21st 1958

XUM

6 months' protection from a single dose

EXCEPT IN AREAS WHERE FLY ATTACK IS PARTICULARLY HEAVY AND PROLONGED, PROTECTION FOR 6 MONTHS MAY BE EXPECTED FROM A SINGLE DOSE OF PROTHIDIUM.



PROTHIDIUM

the soluble drug for the prophylaxis of bovine trypanosomiasis

Prothidium is available as 0.5G tablets in bottles of 20 and 100.

Further information gladly supplied on request.

Boots PROTHIDIUM

-another product of Boots research

BOOTS PURE DRUG COMPANY LTD.,
International Division, NOTTINGHAM, ENGLAND

BETA-FERM Plus

is the complete vitamin supplement

containing distillers solubles with their

'GROWTH FACTOR'

56 lbs. of Beta-Ferm will supply

		gms.
B1	—	0.112
B2	—	2.52
B6	—	0.28
Nicotinic acid	—	14.00
Pantothenic acid	—	4.48
K	—	1.68
Choline	—	89.6
Vitamin A	—	8,000,000 I.U's.
Vitamin D3	—	2,000,000 I.U's.
Vitamin E	—	84.0 I.U's.
Folic Acid		

Beta-Ferm-Plus helps to produce and maintain healthier, stronger and faster growing stock with increased productivity. Easy to mix, simple to use.

BETTER FEED

BETA-FERM Plus

BETA

Write for further information to :

V. W. EVES & CO. LTD., Beta Works, Fowler Road, Hainault, ESSEX

The
VETERINARY RECORD

Founded by William Hunting, F.R.C.V.S., in 1888

7, MANSFIELD STREET, PORTLAND PLACE, LONDON, W.1. MUSEUM 6541

No. 25 JUNE 21st, 1958 Vol. 70

Registered for Transmission as a Newspaper *Price 2s. post free*

A Brucellosis Survey in Dairy Herds with Particular Reference to Diagnostic Methods Including the Vaginal Mucus Test

BY
W. R. KERR, J. K. L. PEARSON,
AND
J. E. F. RANKIN

Veterinary Research Division, Ministry of Agriculture, Stormont, Belfast

SUMMARY.—A survey to determine the incidence of Brucella abortus *infection was carried out on 147 dairy herds in Northern Ireland. The results are recorded and there is discussion on the methods of carrying out a programme of brucellosis eradication.*

The presence or absence of disease in each herd, and in each individual cow, was determined by the combined use of agglutination tests on blood serum, milk whey, and vaginal mucus, and also by guinea-pig inoculation. The severe limitations of the serum test imposed by the use of live Br. abortus *vaccine are demonstrated. It is also shown that this vaccine causes difficulty in interpreting the whey agglutination test in certain circumstances. Evidence is produced to show that tests on vaginal mucus are not influenced by the use of the strain 19 vaccine subcutaneously, and the use of this test as a diagnostic agent is discussed.*

The results of the survey show that a significant number of herds contained one or more vaccinated cows which disseminated infection via the udder and which were not suspected of infection by their owners. The small proportion of these herds reported by the public health authorities is mentioned and the limitations of the present system of random bulk milk testing is noted.

The possible use of strain 19 vaccine intravaginally is being explored as a method of vaccination and some results are given of experimental work in this connexion during the period of the survey.

FOR many years the problem of brucellosis has been mainly one of control. In more recent years, however, some countries, having completed their tuberculosis eradication schemes, have turned their energy toward the eradication of brucellosis. Noteworthy examples are Sweden, Denmark, and U.S.A. The literature on this disease is voluminous, full of interest and validity, but not without complexities. Based on the information contained therein schemes of eradication have been successfully carried out. Much of this information is relevant and generally agreed on, for example, eradication cannot be attained by the use of a live vaccine alone. At the same time it is agreed that vaccination will greatly reduce the incidence of the disease. Again it is agreed that eradication schemes are most successful when the initial incidence is in the region of 5 per cent. or less.

Another feature of control work is a common experience, *viz.* the mental attitude of the livestock owner, as the incidence of brucellosis is lowered so does his apathy increase in regard to doing anything positive towards eliminating the disease—this is unfortunately a common failing. Also some owners believe that it is more economical to accept moderate losses from abortion disease than to take measures necessary to prevent them. Finally the difficulty exists of differentiating the vaccinal serum titres from those arising from natural infection. This is a problem particularly in those areas where multiple vaccination is practised.

In Northern Ireland, however, the primary concern has been brucellosis infection in attested herds and its relationship to public health. Grade A herds, which are part of the Attested Herds Scheme, are tubercle free and sell raw milk under licence. Obviously the eradication of brucellosis from these herds

is essential. At the same time the introduction of the first stages of an eradication scheme was envisaged as an important long-term policy for the livestock industry. As a first step a survey of 147 Grade A herds to ascertain the incidence of brucellosis was made. This involved some 22,000 tests from 7,200 cows on blood sera, milk samples, and vaginal mucus samples.

The relationship of sera, whey, and the milk ring tests has been well investigated by many workers—Goode *et al.*, 1954; Grant *et al.*, 1952; Plastridge, 1954; Cameron, 1955; Tallman *et al.*, 1954, and others. Later the vaginal mucus test (Kerr, 1954; Romvary, 1955) was advanced as an additional diagnostic agent possessing the merit of differentiating field infection from titres arising from vaccination. Subsequent reports on its use have been made by McClure, Schmidt, and Brus. One of the purposes of this survey was to assess more fully the value of the vaginal mucus test as a diagnostic agent and to relate it to the other tests employed. The use of the vaginal mucus test has incidentally focused attention on the carrier cow, the importance of which has to some extent been overlooked.

Methods

Serological Tests

The blood serum tests were set up in the usual manner using the carbolised standard *Br. abortus* antigen prepared by the Ministry of Agriculture Laboratories, Weybridge.

Vaginal Mucus Agglutination Tests

The direct test is a standard practice in this laboratory. The mucus is added to a tube in the approximate quantity and the diluting saline added to make a 1:5 dilution, the tube is then shaken by hand and allowed to set for 30 minutes. One volume of the supernatant fluid of the diluted mucus is added to the first tube. In the second tube one volume of mucus plus one volume saline is placed and from this tube the serial dilutions are made. An equal volume of antigen is added to each tube.

Whey Agglutination Tests

The milk is treated in the orthodox manner by adding 0.5 ml. rennet to 15 ml. of milk which is then subjected to 56° C. in a water bath for 20 minutes. The resulting whey is drawn off and treated in a similar manner to serum. The whey test for the purpose of the survey and the desire for quantitative results was preferred to the A.B.R. milk test. Finally the end point of serum, whey, and mucus tests was always determined.

Positive milks and vaginal mucus samples, with a corresponding number of negatives as controls, were injected into guinea-pigs to ascertain the presence or absence of *Br. abortus*.

Standards

At the outset the question of positive and negative standards raised some difficulties. In the survey 42 per cent. of all cows in the clean vaccinated herds possessed a serum titre of at least 1:20. This was probably related to multiple vaccination. The positive animal was finally regarded as one that possessed a titre of 1:10 in whey or vaginal mucus or in both, regard being paid to certain circumstances affecting the whey test which are discussed later. In some instances as a precautionary measure a positive interpretation was given even when whey and mucus titres were negative but with the serum titre much in excess of the herd average arising from vaccination. A titre of 1:10 or higher in the mucus test was definitely regarded as indicative of a naturally infected animal.

The practice of multiple vaccination sets a problem in diagnosis particularly in an eradication scheme. The position of the blood test in two herds is given as an example. The history of freedom from clinical abortion in these herds was known as well as the fact that the test results showed that all mucus and normal whey samples were negative. All cows had been vaccinated as heifers and again after parturition and indeed some of the cows were subjected to repeated vaccination.

HERD A—80 COWS

Cows showing serum titres below 1:20									3
,,	,,	,,	,,	of 1:20 and less than				1:40	13
,,	,,	,,	,,	,, 1:40	,,	,,	,,	1:80	18
,,	,,	,,	,,	,, 1:80	,,	,,	,,	1:160	24
,,	,,	,,	,,	,, 1:160	,,	,,	,,	1:320	14
,,	,,	,,	,,	,, 1:320	,,	,,	,,	1:640	8

80 per cent. of these cows gave a titre of 1:40 or more.

HERD B—72 COWS

Cows showing serum titres below 1:20									7
,,	,,	,,	,,	of 1:20 and less than				1:40	7
,,	,,	,,	,,	,, 1:40	,,	,,	,,	1:80	20
,,	,,	,,	,,	,, 1:80	,,	,,	,,	1:160	19
,,	,,	,,	,,	,, 1:160	,,	,,	,,	1:320	17
,,	,,	,,	,,	,, 1:320	,,	,,	,,	1:640	2

80.5 per cent. of these cows gave a titre of 1:40 or more.

Some 50 herds in the survey were classified as multiple vaccination herds. 42 per cent. of all the cows in this group showed a titre in excess of 1:20 and 10 per cent. a titre in excess of 1:80.

In selecting standards some qualifications are made with regard to the appearance of agglutinins in the whey. The whey test has given an excellent result but certain anomalies exist and in the interpretation of the test these must be born in mind. In the vaginal mucus test a positive agglutination indicates a "field" or active infection, but in the case of the whey test consideration must be given to certain limiting factors. Colostrum and its concentration of serum globulins is fully appreciated. There are other occasions, however, when serum globulins appear in the whey and lead to confusion in reading the test. When cows in lactation are vaccinated with live S.19 vaccine subcutaneously, serum titres of 1:160 to 1:320 are developed and are followed by whey titres with a maximum of 1:20 which wane and disappear in less than 6 weeks whilst the blood titre remains high. Details and discussions are given later. This phenomenon has been reported by Goode (1954) and has been confirmed by us. When udder permeability is altered the serum globulins appear in the milk and thus the milk reflects the titres present in

the blood. In the case of the whey titre following S.19 vaccination the same explanation apparently does not apply in that the titres to other antigens are not present and it is not likely that this titre is due to the presence of S.19 organisms in the udder cells as it has not been possible to demonstrate the organism, nor is the titre permanent enough to indicate such an event.

When a quarter develops mastitis, serum globulins are present, and if the animal has a blood titre these will be evident as whey agglutinins. These agglutinins are not present in the other quarters, providing they are healthy. Immediately the quarter returns to normal the agglutinins disappear. The appearance of agglutinins following vaccination and also in mastitis may be related to factors influencing udder permeability.

The "drying off" or regression of the udder with the physiological changes related to the next lactation are the most important of the anomalies we have to take into account; the later stages of this phenomenon are well recognised because of the concentration of antibodies in the udder secretion, but it is not generally appreciated that agglutinins may make a relatively early appearance before lactation ceases. The cow may still be producing as much as 2 gallons per day yet serum globulins have made their appearance and it is only by simultaneous testing for other agglutinins such as those for *Salmonella pullorum* and *T. foetus* that the drying off agglutinins can be excluded. In this laboratory the *T. foetus* agglutination test is used to indicate the presence of serum globulins in the milk. In taking samples it is perfectly easy to eliminate colostrum but the other anomalies are more difficult.

General Findings in the Primary Survey Tests

1. From the total of 147 herds, 9 herds (6 per cent.) were found to have actual cases of abortion occurring due to *Br. abortus* (Bang).

2. Thirty-four herds (24 per cent.) contained animals with positive whey, mucus, and blood agglutinations for *Br. abortus* without, at the time of testing, a definite clinical history of abortion.

3. 104 herds (70 per cent.) were accepted as clean herds although many of these herds showed marked evidence of vaccinal blood titres.

Group 1. The active abortion group contained 306 cows of which 92 (30 per cent.) were classified as infected, the relation of the test being as follows:—

Positive blood, whey, and vaginal mucus	54
" " " " negative vaginal mucus	31
" " and mucus, negative whey ...	7

In the test of the 92 cows 85 were positive to whey and 61 positive to the mucus test.

Most of the positive wheys and mucus samples of this group were tested biologically and 50 per cent. were found to contain viable Brucella organisms. It is interesting to note that in the mucus samples tested no viable organisms were found later than 3 weeks after abortion or parturition—evidence indicates, however, that they may return to the mucus in the next pregnancy.

In the case of the udder the organism is present in the milk more often in the later stages of lactation but we have also found it present at all stages from the time of abortion. In one infected heifer the organism was found in one quarter 4 days before a "full-term" parturition. Moreover our evidence shows that the excretion of the organism by the udder may be sporadic despite the presence of a constant whey titre.

Group 2. Classified as the inactive or carrier group; infection in these herds appeared to be quiescent in that only very occasional abortions were admitted and many of the farmers were quite unaware that the disease even existed in their herds. In fact 10 of these owners were most emphatic that the disease did not exist in their herds.

This is an important group from the point of view that these animals may even be sold unwittingly and act as a reservoir of infection to susceptible animals. The farmer may therefore sell animals under these circumstances without any reflection on his honesty. This cause of spread of infection is significant in that 38 per cent. of the positive vaginal and whey samples of this group contained viable *Br. abortus* organisms.

The experience gained in working with the inactive group emphasises the danger of this group as a potential source of spread of infection to susceptible animals. These herds gave evidence of one or more carriers with field infection in the uterus and which at parturition excrete virulent organisms followed later by their appearance in the udder. Moreover, individual cows have been investigated which have obviously carried infection for long periods, even several years.

The most significant danger, of this group in particular, is the spread of infection to humans, and for this reason the Public Health aspect must be borne in mind. Indeed, available evidence suggests that brucellosis, acute and chronic, is a serious milk-borne disease of man. Cases of acute undulent fever still occur amongst the population although its incidence has been reduced by the use of pasteurisation. Pasteurisation, however, does not protect the person who handles, milks, and cares for the cow. It is interesting to note that chronic brucellosis in man has been recognised in this country (Davies, *B.M.J.*, November 9th, 1957). This is a chronic intracellular infection usually not preceded by an acute attack, characterised by a specific group of symptoms, a marked skin sensitivity, and absence of circulating antibodies. Apart, therefore, from the agricultural angle, the Public Health aspects are such as to render the institution of eradication schemes, in countries which have not already undertaken them, imperative. Drug therapy as yet gives no promise of an effective treatment for this disease. The use of a live vaccine can lead to a marked reduction in incidence but not to an elimination of the disease. The use of vaccine gives rise to another problem, the immunity gained is not absolute and in the presence of a virulent field infection a carrier status may arise, that is the cow that may calve down apparently normally and still excrete infection. This may be an intracellular infection of the uterine mucosa, a state of infection not fully appreciated.

Another aspect of this group is that of infertility. We find occasionally in these herds a degree of low conception in some cows whether artificial insemination is practised or natural service. Cows with a positive vaginal mucus test are implicated in this type of infertility.

This group contained 1,497 cows of which 130 (8.6 per cent.) were positive. The tests analysed show:—

Positive blood, whey, and mucus	59
„ „ „ negative mucus	64
„ „ negative whey, and positive mucus	7

123 whey positive.
66 mucus samples positive.

The results of the inactive group differ somewhat from that of the active group in that the percentage positive to all three tests was 45 per cent. as against 60 per cent. in the active group. It was most satisfactory that all bloods gave a positive response. The main problem, however, is still that of the false positive arising from vaccination. The false negative is a lesser problem but does exist although not in large numbers. Cows and more particularly heifers following infection may not show appreciable titres for many months and may approach parturition or actually abort before the titre reaches positive standards. In a first test on an infected herd, serum negative heifers should be regarded with caution.

The Relationship Between Whey and Vaginal Mucus Titres and Infection

Sixty-nine samples of vaginal mucus and 91 samples of milk taken in the survey were submitted to biological examination. All of these gave positive agglutination results. 34 of the 91 whey samples and 20 of the 69 mucus samples were positive biologically. The positive figures in relation to titre are of interest. Roepke *et al.* (1957) in their interesting paper recorded that *Br. abortus* was isolated from 18.8 per cent. of the 53 reactors which were placed in their whey negative class, that is cows serum positive and whey plate negative or one plus positive. Two serum positive cows in our survey were sampled several times and they were on some occasions whey negative and biologically positive. Multiple biological examinations are essential to determine finally the freedom of the udder from *Br. abortus*.

9% of the biologically positive milks had a whey titre of	1:10
15% „ „ „ „ „ „ „ „ „ „	1:20
15% „ „ „ „ „ „ „ „ „ „	1:40
27% „ „ „ „ „ „ „ „ „ „	1:80
33% „ „ „ „ „ titres in excess of	1:80

From these results it was found impossible to relate the height of the serum or whey titres with the presence of viable organisms in the milk. In the case of vaginal mucus samples a further difficulty arose in that we were unable to isolate the organism at any period more than 3 weeks after abortion or parturition irrespective of the height of the titre. It was shown that 25 per cent. of the 1:20 titres were biologically positive as also were 25 per cent. of the 1:80 titres, all the positive results being from samples taken within the 3-week period. This again would suggest that as in the whey tests there was no direct relationship between titre and presence of organism.

The Relationship of Vaccination by S.19 to Agglutinins in Whey and Vaginal Mucus

Experimental

Thirteen heifers and 35 cows with serum titres varying from negative to a maximum of 1:20 were vaccinated with 5 ml. live S.19 vaccine subcutaneously.

Following vaccination the serum titres ranged from 1:160 to 1:1,280.

At 14 days after vaccination	3 cows showed a whey titre of	1:20
	13 „ „ „ „ „	1:10
	11 „ „ „ „ „	1:5
	8 „ „ negative titres	
At 30 days	1 cow showed a whey titre of	1:20
	5 cows „ „ „ „ „	1:10
	8 „ „ „ „ „	1:5
	21 „ „ „ negative titre	
At 8 weeks	7 cows showed a whey titre of	1:5
	28 „ „ „ negative titre	

At 12 weeks all wheys were negative

Mucus samples from the same cows and heifers were negative except on such occasions when extravasated blood was present and these samples on retest were uniformly negative. The authors have no explanation as to the temporary presence of agglutinins in the whey following vaccination. It is improbable that it is due to the presence of S.19 organisms in the udder as all attempts at cultural and biological examinations failed to demonstrate the organism. In any case the titre is much too transient for this. S.19 organisms introduced into the udder induce a high and largely permanent titre in the whey. It may be that it is due to a circulating permeability factor.

Vaginal Mucus Titres Following Vaccination by S.19 Intravaginally

This experiment belongs to another aspect of the brucellosis work and therefore is not directly related, but as the intravaginal route of vaccination has a possible future it has a bearing on diagnosis and for that reason the occurrence and persistence of agglutinins in the mucus are recorded.

Eight heifers vaccinated intravaginally with 5 ml. S.19.

Blood Titres

1 heifer developed a titre of	1:5	on the	6th day
4 heifers „ „ „ „	1:5	„ „	8th „
3 „ „ „ „ „	1:5	„ „	9th „

The maximum blood titre recorded was 1:160 in the case of 1 heifer at the 17th day and three others reached 1:80. At 4 months all blood titres fell to 1:5, or were negative.

Vaginal Titres

1 heifer developed a titre of 1:5 at 8 days
2 heifers „ „ „ „ 1:5 „ 17 „
2 „ „ „ „ „ 1:5 „ 19 „
1 heifer „ „ „ „ 1:5 „ 23 „
1 „ „ „ „ „ 1:5 „ 63 „
1 „ remained negative

The maximum vaginal mucus titre was 1:80 at the 15th day in the case of the heifer which showed the early titre and it was the only one to exhibit a slight vaginitis. At 4 months all vaginal mucus samples were negative. 16 other heifers were also vaccinated intravaginally and in this case no blood titre exceeded 1:20 and at 4 months mucus and serum titres were negative.

The introduction intravaginally of a live S.19 vaccine in clean adults is followed by transient serum and mucus titres which disappear after 4 months. (At the end of 2 months no titre exceeded 1:20.)

Control of Herds Excreting Brucella Organisms in Milk Supply

The owners of a small number of herds in the quiescent group were tested for the purpose of eradication due to the fact that some were reported by the Public Health Authorities because their milk supplies contained viable brucella organisms or agglutinins and in 2 cases because undulant fever cases had occurred amongst the workers and milk consumers. Under the circumstances the farmers were most willing to co-operate in an eradication experiment. A brief record of the 6 farms involved is given.

Herd 1

One hundred and fourteen cows. History of 5 abortions in 6 years in a multiple vaccinated herd. Some degree of infertility was also in evidence and it was for that particular reason that the herd was investigated. Eight cows were found to be mucus and whey positive reactors with viable organisms present. Since removal of reactors two complete herd tests have been made and no further reactors have been found.

Herd 2

Sixty-five cows. A herd without a history of clinical abortions. One whey and mucus positive found in the first test carried out in 1956. Following removal of reactor two clear herd tests have been made.

Herd 3

Twenty-five cows. A herd with no abortion history. A vaccinated herd with viable brucella organisms in the milk supply. Two mucus and whey positives were found. Following their removal two clear herd tests have resulted.

Herd 4

Forty-seven cows. A flying herd with a previous history of abortions in 1953 and 1954. Abortions had ceased but Brucella infection was reported in the milk supply. Five positive whey and vaginal mucus animals were removed and the management of the herd changed to a self-contained policy. Four months later a complete herd test was carried out and found to be clear; unfortunately it was not possible to make further tests on this herd.

Herd 5

Forty-seven cows. A calfhood vaccinated herd. One abortion in 1956. On test this was found to be the only positive and it was removed. On two further tests no reactors were found.

Herd 6

Thirty cows. A history of sporadic abortions which were so few in numbers as not to interfere with the breeding programme. S.19 vaccination had been carried out but somewhat haphazardly in its application. After *Br. abortus* was found to be present in the bulk milk 3 whey and mucus reactors were detected and all were found to be excreting organisms. Only one subsequent herd test was made 3 months later and it was found to be clear.

Discussion

Public Health interest in the problem of brucellosis has increased in recent years and has stimulated the veterinarian to seek new measures of control and diagnosis. The carrier cow in this respect is a greater problem than the cow which aborts, as the use of vaccine controls the incidence of abortion to a high degree; but infected cows may persist in vaccinated herds and excrete viable organisms in their milk either continuously or sporadically for several years.

Attested herds in Northern Ireland producing milk not subjected to pasteurisation before use required investigation and led to the present survey. Some 11 herds were reported by the Public Health authorities of which only 6, when tested, were found to contain infected cows. The remaining 5 herds were reported on the grounds of a low whey titre. This was found to result from cows in late stages of lactation whose milk contained serum antibodies originally induced by vaccination. Altogether a total of 43 of the 147 herds were found to be harbouring infection. Only 2 of the 9 active herds and 4 of the 34 inactive carrier group were picked out by the public health laboratory tests, and the limitations of sporadic testing of bulk milk supply must therefore be considerable. Indeed the recognition of human brucellosis cases was an important guide to the source of infected raw milk and primarily led to the testing of the supply.

All individual animals in a herd must therefore be sampled and tested on at least one occasion before an assessment of the carrier state can be given. Blood sampling alone is insufficient and to declare a herd free from infection all whey and vaginal mucus titres must be engative. If the herd is vaccinated with strain 19 the system of vaccination should be considered when interpreting the blood titre results and it would appear to be safe sometimes to regard a cow,

which has been vaccinated on more than one occasion, as being clear of infection if the blood serum titre does not exceed 1 : 320. To a lesser extent the whey titre may be influenced either following recent vaccination or in late lactation or in the newly calved cow, and occasionally if mastitis is present; but a study of the circumstances in each case will usually clarify the picture.

Intravaginal vaccination appears to reduce some of the above difficulties which follow the use of vaccine subcutaneously, but this method of protection requires further research, if likely to be of value in an eradication programme.

In the infected herd the blood testing of individual animals is probably unnecessary after a preliminary survey of the total stock. Whey testing alone might suffice and any animal showing a titre of 1 : 10 or more regarded with suspicion and the milk tested biologically. Only 2 cows which were whey negative yet excreting organisms in the milk were found in this survey; but any such animals ought to be detected by high blood titres in the initial tests. Multiple guinea-pig biological examinations are not practicable in an eradication programme, but if maximum evidence of infection is being sought, it should be taken into account that organisms are not excreted in the milk in some infected cattle until 3 weeks after parturition or active abortion. Organisms in vaginal mucus on the other hand, cease to exist from the third week onwards, irrespective of the height of vaginal mucus titre, and should be sought biologically immediately after calving.

Herds most likely to be wrongly cleared by bulk testing of milk are those containing only one or two infected cows, particularly if the milk titres of the cows concerned are low. There is obviously little relationship between the whey titre and the presence of organisms in the milk, and the existence of one excreting cow with a whey titre of only 1 : 10 or 1 : 20 can be potentially very dangerous as a source of infection and indeed difficult to detect. Where small numbers of infected animals are found, however, it is economically practical to dispose of reactors and the success obtained in the 6 herds mentioned where this was done was complete.

There is, unfortunately, a greater risk of brucellosis in man arising from badly infected herds and here the disposal of reactors becomes an economic problem. In one instance 25 reactors were found in a herd of 47 animals following an active abortion outbreak. Pasteurisation of the milk was the only possible course, as in other similar farms, but the farmer, his family, and his workers using the untreated raw milk remain exposed to infection. Active herds of this kind formed only 6 per cent. of the group surveyed and a reasonable hope could be given to the owner that it would be economically possible for him to dispose of reactors within a 2-year period if he adopted a system of calf-hood vaccination.

The retesting of the remaining animals after reactors are removed is, of course, essential and according to the severity of infection, and perhaps some management factors, should be carried out within 3 months. Cows going dry during that interval should be tested after calving and all new purchases similarly tested if the herd is not self contained. In-calf heifers in carrier herds not yet using vaccine might also re-introduce infection into the byre following calving and should also be considered. Viable organisms were demonstrated in the udder secretion of one such heifer in this survey four days prior to parturition. The infection was present in only one quarter and was constantly found in that quarter throughout the following lactation including the first 3 weeks.

Unforeseen difficulties such as this will naturally hamper progress, but with a 70 per cent. freedom at the outset the prospects of obtaining complete eradication in all herds selling raw milk are most encouraging. Unco-operative herd owners will be encountered from time to time, but the introduction of legislative measures will ensure co-operation and enable the farmer to benefit financially from an improved milk supply.

Compulsory calfhood vaccination within groups or schemes would be an attractive policy leading to a reduced incidence as low as 5 per cent. or less amongst susceptible stock. Once the incidence is reduced to the region of 5 per cent. eradication could be usefully and economically applied. It is the considered opinion of the writers that the use of all three tests is essential in approaching the diagnosis of the extent of active or field infection within a herd. The disease has been eradicated in other countries on the serum test alone but this must be of necessity lead to the destruction of many non-infective or recovered non-excreting animals.

Cameron (1957) in a paper comparing whey and blood tests fully appreciates the problem of multiple vaccination and its effect on the blood test and considers that the false blood position to be a great problem. He also discusses the limiting factors in interpreting the whey test. He appreciates the fact that a small number of whey negatives shed *Br. abortus* but considers that as they are in infected herds they can be ignored.

A useful application of the whey test is that of screening herds. Samples are easily and simply obtained, rapidly tested, and the presence of a number of reactors without evidence of very recent vaccination or approaching of end of lactation is evidence of field infection. Once that has been determined all three tests should be applied to the herd in order to pinpoint the full extent of the infection.

The vaginal mucus test's first value is as a positive indicator of field infection. Moreover, we have no evidence as yet of false positives. Its second value is that some infected animals do not become infected in the udder and remain serum and mucus positives only. A further use of this test is made by the general practitioners in sending in vaginal mucus samples for diagnostic purposes following suspect Brucella abortion in place of sending a foetus. We have not yet experienced a positive foetus and a negative mucus titre when taken within 3 weeks of abortion.

(Please see references in adjoining column)

Protrusion of the Intervertebral Disc in the Cat

BY
A. S. KING and R. N. SMITH
Department of Veterinary Anatomy
AND
V. M. KON
Third Year Veterinary Student, The University, Bristol

SUMMARY.—1. *Dorsal protrusions from the intervertebral discs have been found in* 26 *of* 100 *adult cats taken at random; altogether* 91 *discs had protrusions. Macroscopic degenerations other than dorsal protrusions were investigated in* 50 *of these cats, and were found in about half of them. The incidence of dorsal protrusions is thought to be much the same as in the non-chondrodystrophoid breeds of dog.*

2. *Dorsal protrusions in the cat are of the same two types as in the dog. In protrusions of type I the annulus fibrosus is completely perforated: in those of type II it is only partly perforated. Protrusions of type I accounted for less than a fifth of the total. The protrusions of type II in the cat appeared to be relatively much the same size as they are in the dog: those of type I appeared to be relatively smaller in the cat than in the dog.*

3. *As in the dog, dorsal protrusions were seldom found in thoracic discs covered by the conjugal ligament. Apart from this the distribution was altogether different from the dog. Thus cervical protrusions were more common than lumbar protrusions; the thoraco-lumbar region was little affected; and lumbar protrusions were commonest in the mid-lumbar region.*

4. *It is theoretically expected that these protrusions might sometimes produce chronic symptoms of disc protrusion in old cats. The neck and fore limb may be involved. A few acute cases might also be expected.*

References

BLAKE, G. E., & MANTHEI, C. A. (1952). *Proc. 89th Ann. Meet. A.V.M.A.* 98-104.

BRUS, D. (1956). Hertogenbosch, Boxtel. Personal communication.

CAMERON, H. S., & KENDRICK, J. W. (1955). *J.A.V.M.A.* **126.** 131-3.

———, & ———. (1955). *Proc. 59th Ann. Meet U.S. Livestock Sanitary Assn.* 138-41

———. (1957). *J.A.V.M.A.* Vol. 130, No. 3. 130-44.

GOODE, E. R., AMERAULT, T. E., & MANTHEI, C. A. (1954). *Proc. 58th Ann. Meet. U.S. Livestock Sanitary Assn.* 180-92.

KERR, W. R. (1955). *Brit. Vet. J.*, April. Vol. III, No. 4. 169-78.

LAWSON, J. R. (1950). *Vet. Rec.* **62.** 823-30.

MCCLURE, T. (1956). Personal communication. Hamilton, N.Z.

PLASTRIDGE, W. N. (1954). *Proc. 58th Ann. Meet. U.S. Livestock Sanitary Assn.* 136-79.

ROEPKE, M. H., STILES, F. C., WHITE, T. G., & DRIVER, F. C. (1957). *J.A.V.M.A.* **131.** 170-3.

ROMVARY, J. (1955). Magyar Allatorvosok Lapja, August, 1955.

SCHMID, G. (1956). *Schweiz. Z. Path. Bakt.* **19.** 539-42.

TALLMAN, K. L., & HERMAN, H. A. (1954). *Research Bulletin 546.* University of Missouri, College of Agriculture.

Introduction

ALTHOUGH it is certainly well known that cats suffer from paralysis (Pommer, 1937; Kirk, 1953) the causes remain obscure. Some cases can be explained by gross trauma, but Frost (1956) has noted that paraplegia and paresis of the hind limbs can occur without either trauma or infection; aortic thrombosis would then be considered as one of the possible causes (see Freak, 1956, and Joshua, 1957). Frost went on to remark that the symptoms are often comparable with those of the milder cases of protrusion of the intervertebral disc in the dog. In his work on protrusion of the disc in the dog, Hoerlein (1953) mentioned that he had observed clinically one cat which was proved to be suffering from protrusion of a disc. However, apart from this one case, no one seems to have given any really compelling reasons for including protrusion of the disc among the possible causes. Not much has been written about the pathology of the intervertebral disc of the cat. Hansen (1952) said that the cat "seems indifferent to diseases in the discs," and again that "disc lesions seem to be of no importance in the horse and cat." This could mean either that lesions of the discs seldom occur or that they occur but fail to produce symptoms; the context seems clearly to indicate the former interpretation. However, be this as it may, to the best of our knowledge no one has published an account of lesions of the intervertebral disc in the cat, except for an occasional mention of calcification (*e.g.* that by Frost).

In 1956 we began to measure the intervertebral discs of the cat to test Hansen's hypothesis that the discs may be relatively short in mammals which are not susceptible to lesions of the disc. We were surprised to find that the first cat had protrusions into the neural canal from 7 discs. So we decided to survey the incidence of dorsal protrusions in this species. We have now investigated 100 adult cats: dorsal protrusions were present in 26. We found other degenerations even more often, but the details of these will be given elsewhere; the main object here is to call attention to the quite common occurrence of dorsal protrusion from the intervertebral disc in the adult cat.

Materials and Methods

Carcases of cats were obtained at random from local general practices. Animals which had experienced gross trauma of the vertebral column were rejected, but the rest were accepted regardless of any diseases from which they had suffered. Each was X-rayed, and we examined the first 100 cats which

were adult in that all their epiphyses were fused. The practitioners who gave us the cats believed that all ages were represented although older cats probably predominated. It would have been better if the age of each cat had been known, but under the circumstances this was impossible.

After fixation in formalin, the floor of the neural canal was searched for dorsal protrusions. In all cats (except one) in which dorsal protrusions were found every disc in the vertebral column was transected. Also, every disc in the last 50 cats was transected whether dorsal protrusions were present or not. The cut discs were examined not only for the tracks of dorsal protrusions but also for other macroscopic degenerations. A dissecting microscope was used at all stages.

Criteria for Dorsal Protrusions

The two types of dorsal protrusion which Hansen (1952) recognised in the dog also occur in the cat. In type I the protruded material has perforated the annulus fibrosus; in type II it has worked its way towards the surface of the disc, causing the outer lamellae to bulge. The following criteria were used:—

Type I. (1) Protruded material must be seen poking through the surface of the disc, or there must be a definite hole through which protruded material could have escaped. (2) The track of the protrusion must be found on the transected disc.

Type II. (1) The projection must be sufficiently large and prominent to be clearly distinct from the surface of the disc. A circumscribed, knob-like projection was accepted, even when relatively small, because of its prominence; a smooth, mound-like swelling had to be outstandingly large. (2) The interior of the disc must be degenerate.

Results

Incidence of Dorsal Protrusions

Dorsal protrusions were found in 26 of 100 cats. The total number of discs with protrusions was 91. Some cats had several discs with protrusions (called multiple protrusions below); the greatest number seen in one cat was 11, but 11 of the 26 cats had only a single disc with protrusion. This distribution is shown in Fig. 1.

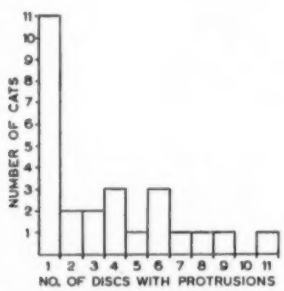


FIG. 1.—Distribution of the number of discs with protrusions per cat.

Protrusions of type I accounted for only 16 of the 91 discs with protrusions. In 3 cats the only protrusion was a single one of type I.

Features of Dorsal Protrusions

Type I. Protrusions of type I were usually small (see Fig. 7). They seldom exceeded 2 mm. in diameter. The protruded material was either firm and circumscribed as in Fig. 7, or soft and loose in texture. Sometimes there was only a crater, suggesting that the protruded mass had been detached. When the disc was transected the track of the protrusion was nearly always obvious (Figs. 8 and 9). The protrusion rarely spread along, and never extended round, the spinal cord, and only once adhered to the dura mater. Signs of epidural haemorrhage were found with protrusions of type I in 2 cats. In one the blood was recent and profuse, extending from the beginning of the spinal cord to near the thoraco-lumbar junction: two cervical discs had protrusions of type I. In the other, what appeared to be fibrinous deposits lay on the dura in the cervical region and on the floor of the neural canal at the end of the thoracic region: the disc T11-12 had a protrusion of type I which adhered to the dura. These 2 were the only cats in which signs of haemorrhage were found.

Type II. Protrusions of type II were generally larger than those of type I. The simplest ones consisted of a gently curved mound (Fig. 11), and others were knob-like (Fig. 10). The larger knobs were 2 or even 3 mm. in diameter, but never exceeded 4 mm. A cluster of 2 or 3 mounds or knobs on one disc (counted as one protrusion) occurred sometimes (Fig. 15) and could produce quite a formidable enlargement. The larger protrusions sometimes fitted a dent in the spinal cord. Protrusions of type II usually seemed more or less firm in texture. They were never (macroscopically) calcified. When the disc was transected, distortion or disruption of the dorsal part of the annulus fibrosus could usually be seen (Figs. 13 and 14).

Both types of protrusion were situated anywhere from a median to an extreme dorso-lateral position. In the cervical region several of the larger dorso-lateral protrusions touched the related spinal nerve; such contact is virtually limited to the cervical region, because in the other regions the spinal nerves lie cranial to the intervertebral discs.

Distribution of Dorsal Protrusions in the Vertebral Column

The distribution along the vertebral column of the 91 discs with dorsal protrusions (of types I and II) is summarised in Fig. 2. The 6 cervical discs (C2-3

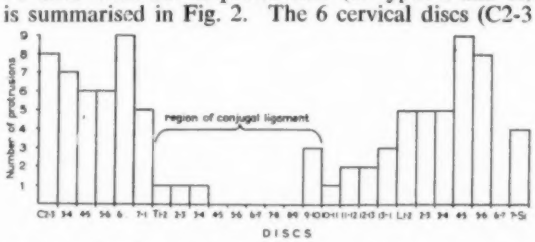


FIG. 2.—Distribution in the vertebral column of the 91 discs with dorsal protrusions of types I and II.

to C7-T1 inclusive) had the most protrusions, the total number of discs with protrusions in this region being 41. There appeared to be a progressive descent in the frequency of protrusion from C2-3 to C7-T1, except for a curious peak at C6-7. The 7 lumbar discs (L1-2 to L7-S1 inclusive) had slightly fewer protrusions, the total number of discs with protrusions in this region being 36. The 4 discs at the end of the thoracic region (T10-11 to T13-L1 inclusive), including the disc at the thoraco-lumbar junction, were much less affected, for there were only 8 discs with protrusions in this region. There seemed to be a progressive rise and fall in the incidence of protrusions from T10-11 to L7-S1 with a distinct peak in the mid-lumbar region (L4-5). In the region of the conjugal ligament (T1-2 to T9-10 or T10-11) true dorsal protrusions were rare; the conjugal ligament joins the heads of each pair of ribs in this region much as in the dog.

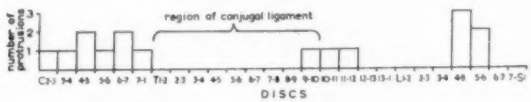


FIG. 3.—Distribution in the vertebral column of the 16 discs with dorsal protrusions of type I.

The distribution of protrusions of type I is shown in Fig. 3. They seemed to be associated mainly with those discs most subject to dorsal protrusion as a whole, *i.e.* the cervical and mid-lumbar discs; but some occurred near the end of the thoracic region. However, the number of type I protrusions is so small that the significance of their distribution is uncertain.

Although true dorsal protrusions were rarely found in the region of the conjugal ligament, diffuse mound-like swellings were often seen. These we called "thoracic bolsters." They extended transversely across the disc (see Fig. 12), but seldom projected far above its surface. They were invariably associated with degeneration either of the conjugal ligament or of the disc itself.

Maturation and Degeneration

In the adolescent cat the frontier between the annulus fibrosus and the nucleus pulposus is abrupt (Fig. 5). The nucleus pulposus is jelly-like. Its narrow zone bordering the annulus is translucent; the rest of it is more or less opaque owing to numerous, whitish, flocculent areas (Fig. 5). This appearance may last far into adult life; one 18-year-old cat still possessed 4 discs which looked like those of an adolescent. However, changes do occur; some may be regarded as part of a normal process of maturation with age, and others as degeneration. In our interpretation maturation is the simple replacement of the jelly of the nucleus pulposus by fibrous tissue; degeneration includes not only dorsal protrusion but also ventral and lateral protrusion, disorganisation of the lamellae, calcification, and brown discoloration.

These degenerations were studied macroscopically in the last 50 cats. In 15 of them all the discs still looked the same as in adolescence. In the other 35 cats changes had occurred, and in 28 of these some discs showed degeneration. Much the commonest degeneration was disorganisation of the lamellae, which varied in its degree from localised disruption or distortion of lamellae to virtual destruction of the whole disc. It was seen in 27 cats and involved altogether 178 discs; it was particularly common in the 9 discs between the second and eleventh thoracic vertebrae. Ventral protrusions were found in 8 cats, 14 discs being affected. One disc with a true lateral protrusion was found. Calcification was found in only 4 discs (3 cats); in one of these discs the whole nucleus pulposus was calcified and could be seen on a radiograph; another had a protrusion of type II, but the small, central, calcified area was not directly associated with the protrusion. Brown discoloration was found in 11 cats.

Discussion

Dorsal protrusions have been found in 26 of 100 adult cats, and degenerations of other sorts have been found even more often. Therefore the cat is not exempt from lesions of the disc. Whether or not it is affected as much as the dog it is hard to say. Hansen (1952) found dorsal protrusions in 16.6 per cent. of 561 dogs which included clinical cases of disc protrusion; Hoerlein (1953) found them in 41.5 per cent. of 130 dogs taken at random. A survey in progress in this Department has found them in 21 of 53 dogs taken at random. All these figures include both chondrodystrophoid and non-chondrodystrophoid breeds. The chondrodystrophoid breeds are more affected, so if they were excluded the incidence would be lower. At the moment we think that there may not be a great difference in incidence between the cat and the non-chondrodystrophoid breeds of dog, though perhaps the cat is less affected.

This does not mean we believe that *clinical cases* of disc protrusion are as common in the cat as in the dog. Our findings do not prove that clinical cases ever occur in the cat. However, they do suggest that the possibility should be considered. It may be helpful to compare protrusions in the dog (as described by Hansen, 1952) with those seen in the cat. The clinical picture produced by protrusions in the dog is well known; hence the similarities and dissimilarities of protrusions in the cat may indicate the nature of a possible clinical picture for this species.

Although multiple protrusions occur in both dog and cat it is common in both species to find only a single protruded disc: such was found in nearly half of the cats and dogs with protrusions, both in our material and in Hansen's. Also both species have dorsal protrusions of two types, complete perforation (type I) and a bulge with partial perforation (type II). However, the two types seem to differ in detail in the dog and cat. Protrusions of type I are big and mobile in the dog, even spreading round the spinal cord: in the cat they are usually relatively small and discrete. In the dog protrusions of type

II are usually smaller than those of type I, but in the cat they are usually larger: we believe that protrusions of type II in fact are relatively much the same size in the two species. Protrusions of type I appear to be more common in the dog than in the cat (though they are virtually confined to the chondrodystrophoid breeds of dog). They accounted for nearly a third of the dorsal protrusions in Hansen's material and less than a fifth in ours.

The distribution of dorsal protrusions along the vertebral column differs in the two species. In the dog cervical protrusions are not nearly as common as lumbar protrusions, and account for only about 12 per cent. of all dorsal protrusions; far more protrusions occur at the thoraco-lumbar junction than from any other disc. In our cats cervical protrusions were more common than lumbar, and accounted for nearly half of all dorsal protrusions; the region of the thoraco-lumbar junction was not severely affected, the peak of lumbar protrusions being in the mid-lumbar region. Thoracic bolsters have not been reported in the dog.

This comparison of the protrusions of the dog and cat can be given a theoretical clinical interpretation. In the dog protrusions of type I can produce relatively acute and severe clinical symptoms, with an abrupt onset of paralysis. When explosive, with severe haemorrhage, they can be fatal. The smaller relative size of protrusions of type I in the cat suggests that in this species they may be less damaging. Yet the association of haemorrhage with protrusions of type I in 2 of our cats suggests that they may occasionally cause serious damage in spite of their small size, perhaps because they sometimes erupt with violence. Protrusions of type II in the dog may produce no symptoms at all (though it must be remembered that this means no *objective* symptoms), or relatively undramatic symptoms varying from pain and stiffness in the back to some degree of paralysis; they tend to occur in old dogs and are regarded as more or less a senile phenomenon. The similar relative size of protrusions of type II in the cat suggests that they might sometimes produce symptoms like this; from knowledge of the dog one might expect them particularly in old cats. The high incidence of cervical protrusions in the cat suggests that symptoms might include cervical pain and disturbance in the fore limb as well as the hind limb; this possibility is enhanced by the fact that in the cervical region a dorso-lateral protrusion can impinge on a spinal nerve. It is impossible to say whether thoracic bolsters might ever cause symptoms, but probably they seldom project far enough to do so.

Our interpretation of the morbid anatomy into clinical symptoms will now be summarised. From our findings we would expect occasional chronic symptoms of disc protrusion in old cats (pain, paresis, etc.), perhaps involving the neck and fore limb as well as the hind limb. We would also expect a few acute severe cases. However, we wish to emphasise that these suggestions are put forward purely as a working hypothesis. We must also point out some of the main limitations of this hypothesis. Firstly no allowance has been made for factors like the roominess of the neural canal. There may be more room in the neural canal of the cat than there is in the dog; if so, the spinal cord of the cat may be better able to avoid compression. Secondly the age at which protrusions occur in the cat has not been established. We have suggested that old cats are more likely to be affected, but this is an assumption based on knowledge of the dog. In an extension of our survey to 20 cats of known ages protrusions have so far only been found in cats over 11 years old. This conforms to our assumption but the numbers are too small to have any real significance; it will be some time before we have enough observations to be sure of the age incidence.

Our findings do not suggest any simple way of locating a protrusion in the living animal. Since calcification seems to be rare and seldom associated with protrusion it is no good looking for calcified discs on radiographs. Theoretically, a protruded disc should be narrower than its neighbours. However, in practice we found that discs which appeared narrow on radiographs often turned out to be normal, and some discs which were known to have protrusions were not visibly narrower than their neighbours on radiographs. There are several reasons for this. Firstly, discs become narrower not only when they have protrusions but also when they have other common forms of degeneration such as advanced disorganisation. Secondly, it is extremely difficult to obtain radiographs which allow narrowness to be assessed correctly. If a disc is slightly out of alignment with the X-ray beam it will appear narrow on the radiograph. The fact that the cat's normal disc is usually only between 1 and 2 mm. wide at its narrowest point shows how critical exact alignment is. Every disc would have to be X-rayed individually, but even then a slight and undetectable lateral flexion of the vertebral column may put discs sufficiently out of alignment to make them appear narrow.

Acknowledgments.—We should like to thank Professor C. W. Ottaway for his support. Mr. A. Coombs took these photographs and many others; his help was indispensable and greatly appreciated. We are grateful to our colleagues in practice in this city for continuing to give us every possible assistance.

References

FREAK, M. J. (1956). *Vet. Rec.* **68.** 816.
FROST, R. C. (1956). *Ibid.* **68.** 470.
HANSEN, H. J. (1952). *Acta orthopaed. scand.*, suppl. **11.**
HOERLEIN, B. F. (1953). *Amer. J. vet. Res.* **14.** 260.
JOSHUA, J. O. (1957). *Vet. Rec.* **69.** 146.
KIRK, H. (1953). "Index of Diagnosis." 4th ed. London.
POMMER, A. (1937). In Stang, V., and Wirth, D. "Tierheilkunde und Tierzucht." **XI.** 134-40. Vienna.

HOLIDAY EXCHANGE

Dominique Rochat, age 17, of Lausanne wishes to spend six weeks in England from mid-July. He speaks school English, and would help with family or horses in exchange either for half-board, or holiday exchange with boy or girl at a similar period next year. Offers of hospitality should be made direct to Mr. R. M. Loosmore, B.V.SC., at Northcourt Lodge, 80, Northcourt Avenue, Reading.

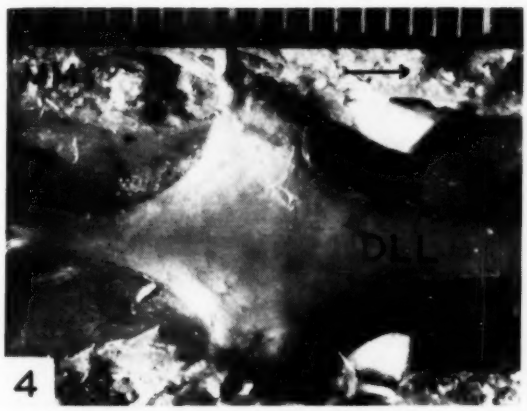


FIG. 4.—Dorsal view of the floor of the neural canal showing the dorsal aspect of a normal lumbar disc (L6-7). The dorsal longitudinal ligament (DLL) spreads out and blends with the dorsal surface of the disc. The arrow points cranially here and in the other figures.

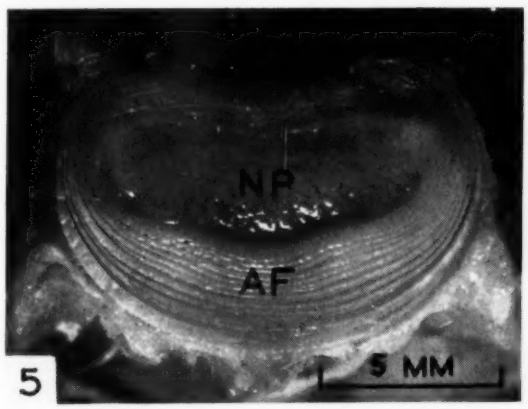


FIG. 5.—Transverse section of a normal lumbar disc showing nucleus pulposus (NP) and annulus fibrosus (AF).

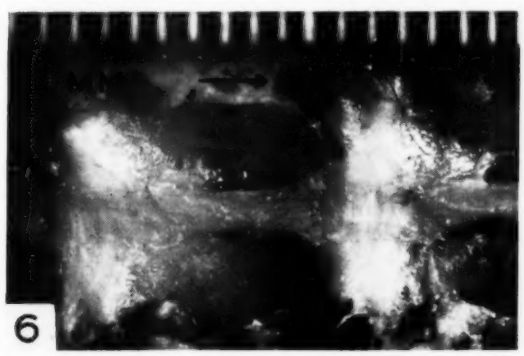


FIG. 6.—Dorsal view of two normal thoracic discs (T2-3, T3-4) in region of conjugal ligament.

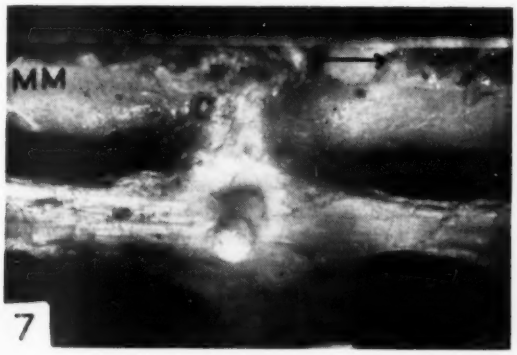


FIG. 7.—Dorsal view of a small double protrusion of type I from a caudal thoracic disc (T10-11). Compare Fig. 4. See also Fig. 8 for T.S.

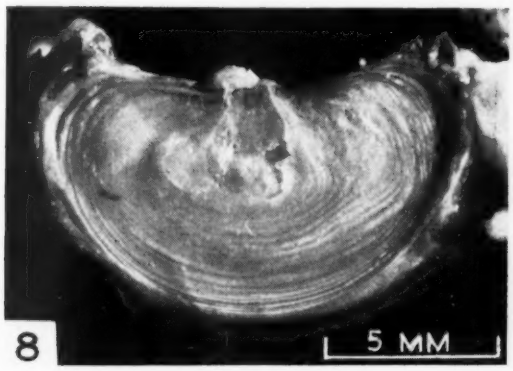


FIG. 8.—Transverse section of the disc in Fig. 7 showing the two small protrusions of type I and their tracks.

FIG. 9.—Transverse section of a large protrusion of type I and its track in a cervical disc (C4-5). See Fig. 16 for a dorsal view of this disc.

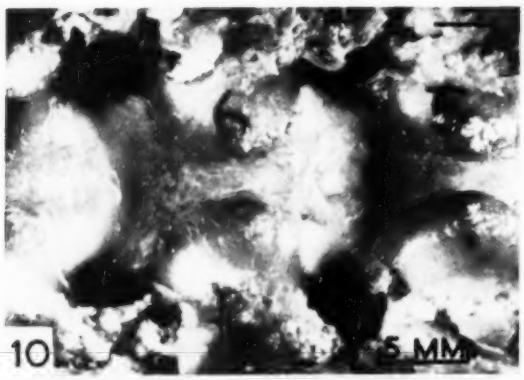


FIG. 10.—Dorsal view of a large knob-like protrusion of type II from a cervical disc (C5-6). The other disc (C6-7) is normal. See Fig. 13 for T.S.

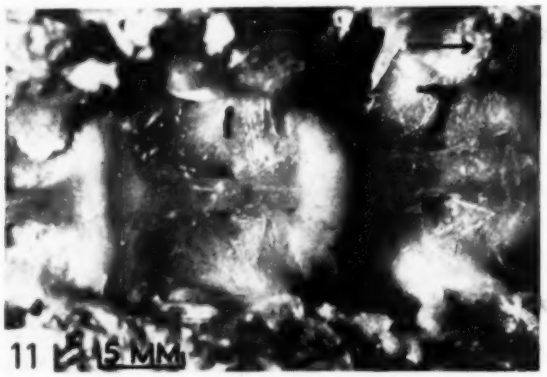


FIG. 11.—Dorsal view of a mound-like protrusion of type II from the last cervical disc (C7-T1). The other disc (T1-2) is slightly swollen. Compare the normal cervical disc on the left of Fig. 10. See Fig. 14 for T.S.

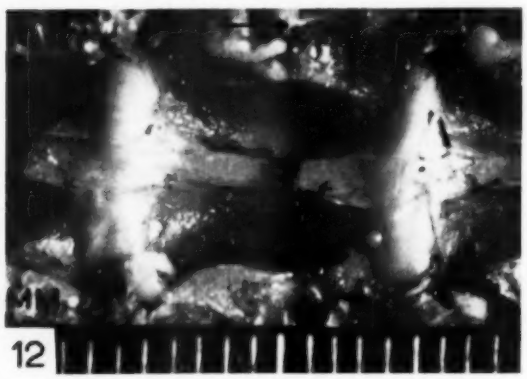


FIG. 12.—Dorsal view of thoracic bolsters on discs T8-9 and T9-10. The one on T8-9 has a tiny nodule on the right. Compare the normal discs in Fig. 6.

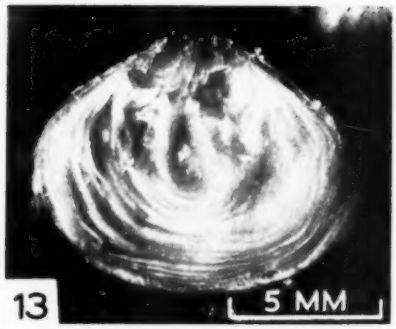


FIG. 13. Transverse section of the disc in Fig. 10, showing a protrusion of type II almost completely perforating the annulus.

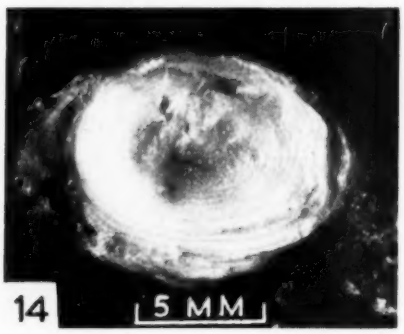


FIG. 14. Transverse section of the disc in Fig. 11, showing a slight disturbance in the dorsal part of the annulus associated with a mound-like protrusion of type II.

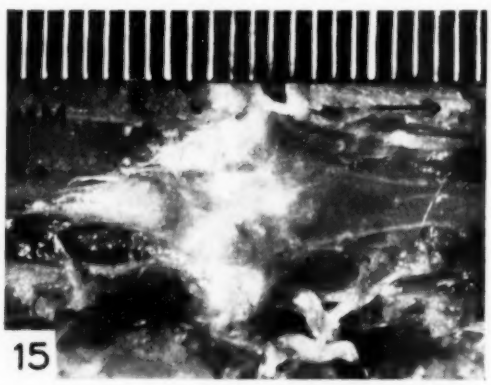


FIG. 15.—Dorsal view. A cluster of knob-like protrusions of type II from a lumbar disc (L4-5). Compare the normal disc in Fig. 4.

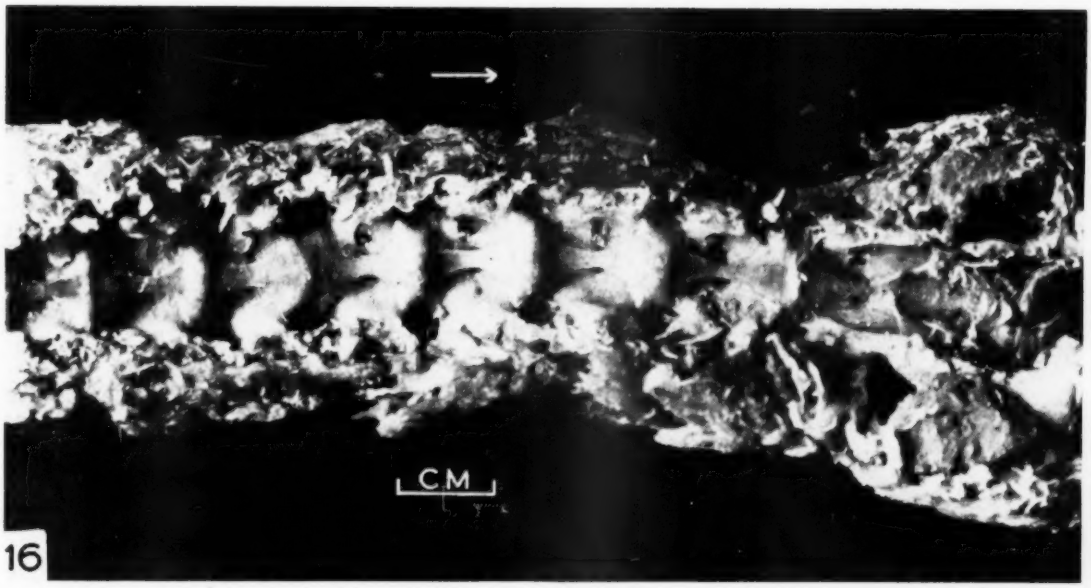


FIG. 16. Dorsal view of multiple cervical protrusions. Disc C2-3, normal. C3-4, small median type I protrusion. C4-5, large protrusion of type I just to right of mid-line (see Fig. 9). C5-6, large median protrusion of type II (see Figs. 10 and 13). C6-7, normal. C7-T1, mound-like protrusion of type II (see Figs. 11 and 14). T1-T2, slightly swollen. Same cat as in Figs. 9, 10, and 11.

Professor T. J. BOSWORTH, M.A, B.Sc., M.R.C.V.S., D.V.S.M.
President of the Royal College of Veterinary Surgeons

The New President of the R.C.V.S.

Professor T. J. BOSWORTH, M.A., B.SC., M.R.C.V.S., D.V.S.M.

AT a special meeting of the Council of the Royal College of Veterinary Surgeons on Thursday of last week, Professor T. J. Bosworth was unanimously and with acclamation elected President of the Royal College for the year 1958-59. Professor Bosworth thus achieves an honour which would have been his a year ago but for the illness of his wife at that time.

The new President is known throughout the profession as a teacher of distinction, being head of the Department of Pathology in the Royal Veterinary College, and as a man of letters. In addition to a considerable volume of published work he is one of the joint editors of the *Journal of Comparative Pathology and Therapeutics*. His academic and scientific colleagues, his many past students, and the profession generally, will wish to congratulate Professor Bosworth on achieving what must be the dearest ambition of most veterinary surgeons.

He was born in 1893, the son of a Bedfordshire farmer, and was educated at Bedford Modern School, the Royal Veterinary College, and London University. He qualified in 1915 and served in the Royal Army Veterinary Corps, being placed in charge of veterinary hospitals in India and South Persia. During the course of his military service he was mentioned in despatches.

He returned to the Royal Veterinary College early in 1920 and completed the course of study for the B.Sc. (Vet. Sci.) degree of London University. He then became Research Assistant to Sir John M'Fadyean, continuing in that capacity until 1923. During the latter part of this period he acted also as Demonstrator in Pathology.

He succeeded the late Professor J. B. Buxton in March, 1923, as Veterinary Superintendent of the Wellcome Physiological Research Laboratories at Beckenham, but resigned from that post in the following November to become Professor Buxton's Assistant Director of the then newly created Institute of Animal Pathology at Cambridge. Until 1939 Professor Bosworth remained at the Institute working on a variety of problems which included actinomycosis and actinobacillosis, abortion in sheep, metabolic disorders of breeding ewes, clostridial diseases of sheep and cattle, salmonellosis and brucellosis. This post, especially in its early days, entailed a good deal of supervisory work as few veterinary research workers were available and more had to be trained to supplement the staff. In passing it is interesting to compare this state of affairs with the number of veterinarians in research work in these days, a remarkable change in so short a time, and one which reflects the changed appreciation of the economic importance of animal disease.

It was clear from the work he did at Cambridge that he was destined for still more important appointments and in 1939 he became Professor of Pathology and Director of the Research Institute in Animal Pathology at the Royal Veterinary College. When, in due course, the College became a School within the University of London, Professor Bosworth was awarded the Chair of Veterinary Pathology in that University.

He has been an active member of the B.V.A. for a number of years and was a member of its Council from 1944 to 1953. He was a valued member of the Editorial Committee of THE VETERINARY RECORD and is a past President of the Royal Counties Veterinary Medical Association. His varied scientific activities are indicated from his past presidency of the Veterinary Research Club of which he was founder, past presidency of the Section of Comparative Medicine, Royal Society of Medicine, and his membership of the Council of the Imperial Cancer Research Fund since 1949.

Professor Bosworth was elected to the Council of the Royal College in 1944, becoming junior vice-President in 1956. He is an active Freemason, having been founder and past master of the Old Bedford Modernians Lodge and present 1st Principal of the London Staffordshire Chapter.

The good wishes of every member of the profession will go out to the new President, a distinguished successor of that line of scholars and men of letters who have adorned the presidential office in the long history of the Royal College. It will be the profession's earnest hope that his will be a happy and successful year of office.

The Victoria Veterinary Benevolent Fund—*Concluded.*

of the Sub-Committee on Thursday) be deferred to the next meeting. A discussion on the Opinion, however, took place and Professor McCunn gave the Council a review of the salient points of the matters discussed.

Date of Next Meeting

It was agreed that this matter be left in the hands of the Officers.

Any Other Matters

Under this head, the question of longer notice of Council Meetings was raised, and it was decided that this matter be placed on the next Council agenda for discussion.

Vote of Thanks

On the proposition of Mr. E. Clark, a hearty vote of thanks was accorded to the Chairman for his conduct in the chair.

A Successful R.C.V.S. Day

A SUMMARISED account of the Day was published in our columns last week, but in preparing this necessarily hasty account in time for press it was not possible to do anything like justice to the success of the occasion. R.C.V.S. Day, as such, is a comparative innovation; but already it has become justifiably notable in the annual calendar of the profession, as is attested by the presence, at luncheon, of Mr. R. A. Butler who, while acting as Prime Minister in addition to his other heavy duties as Lord Privy Seal and Home Secretary, yet found time to attend as guest of honour.

The arrangements were admirable, and those responsible for their smooth working are to be congratulated. It would seem safe to say that the number of veterinary surgeons and guests present was limited only by the accommodation available in the Queen's Chapel of the Savoy, and later in the Savoy Hotel. After the annual Corporate Service and Commemoration of Benefactors the congregation, preceded by the Chaplain and the Officers and Council of the Royal College moved to the adjacent Savoy Hotel where the President and Mrs. Gould received them. Cocktails were followed by luncheon, at the conclusion of which the President, from the chair, proposed the Loyal Toast. Mr. Butler then rose to propose the toast of the Royal College of Veterinary Surgeons, to which he coupled the name of the President. In the course of his remarks Mr. Butler said: "Your profession has emerged into a most prosperous and well-founded condition. I am told that it actually emerged from a meeting 175 years ago between seven gentlemen at Odiham, which is in your President's native county. Therefore, I thought that I should draw your attention to it. The minute book of that early society records:—

> 'That farriery is a most useful science and intimately connected with the interests of agriculture; that it is in a very imperfect neglected state and highly deserving the attention of all friends of agricultural economy.'

Thus, the farriers of the day were to be brought together to help the agricultural industry. That was 175 years ago, and now we find that your profession, from that humble start in the President's own home county, is as respected and admired as any in this country to-day, and I should like on behalf of Her Majesty's Government to congratulate you on the progress which has been made, and the esteem in which you are held throughout the world. Members of the Royal College are practising in no less than 50 Commonwealth territories and in 19 foreign countries. No fewer than 16 of the staff of the Food and Agriculture Organisation of the United Nations are members of the Royal College, and when recently the Pan-American Foot and Mouth Disease Centre of the World Health Organisation was set up, the Director and the Chief of Field Services were chosen from the United Kingdom. That in itself is a further tribute to the standards of the Royal College.

"To-day, in fact, Britain is among the leaders of veterinary education and research. The universities, including Bristol University and my own University of Cambridge as well as Glasgow University of which I am Rector and where I survived the most disagreeable ordeal play their part with you, and I am delighted that no less than two Vice-Chancellors are present to-day. (*Applause.*)

"You have helped the under-developed areas, you have supported the concept of mutual help between nations and you, Sir, have yourself just returned from an extended tour of the British Caribbean Federation and of Venezuela, where you have managed to succeed to the welcome given to Vice-President Nixon without participating in it! (*Laughter.*) By lecture and clinical demonstrations you explained the tremendous advances which have been made in British veterinary science. Mr. Sumner, who is with us to-day and who will speak later, has returned from Uganda and Kenya where he led a delegation of six members of your Council on behalf of the Royal College and the University of London to advise on veterinary education. This I think shows that although your work may be on the farm and with our own animals, you have elevated your science, if elevation is the right word, from your daily duties to a world wide concept.

"It is in that atmosphere that I ask you to drink the health of the Royal College of Veterinary Surgeons. Mr. Gould, with whom I associate this toast, is a member of the Balfour Committee on the Export of Cattle to the Continent for Slaughter, and he has brought his vast knowledge and experience to bear on the problems with which he has to deal. He has perhaps one of the most distinguished practices and one of the best names in the profession. His ancestors were in this profession before him, and they have served the Royal Family. With men of such calibre as Mr. Gould occupying the Presidential Chair, I am sure that the Royal College will go from strength to strength."

The President's Reply

The President, in response, said: "My first duty to-day, my Lord Privy Seal, is to thank you for the very generous terms in which you have proposed the toast of the Royal College of Veterinary Surgeons. We are most grateful to you for sparing the time from the many onerous duties of State which you have to bear in the absence of the Prime Minister, in addition to your heavy departmental duties as Lord Privy Seal and Secretary of State for Home Affairs. We are grateful to your department and, in particular, to your Permanent Secretary, Sir Charles Cunningham, whom we also welcome to-day, for the courtesy and co-operation we receive when discussing matters in which we have mutual interest. I am sure I echo the thoughts of all present to-day in wishing the Prime Minister every success in his mission to the President of the United States and a safe return home.

"In the past I often used to think that inadequate recognition and appreciation of the achievements and the services of the profession was manifested both by the Government and the British public, but your

presence here to-day and the felicitous terms in which you have proposed our health makes this thought no longer tenable.

"If I may be allowed to encroach on the toast to be proposed by our Treasurer—and I should like to congratulate the Treasurer on the honorary degree of Master of Veterinary Science which is to be conferred upon him by his own university of Liverpool—I should like to say how glad I am to see Sir James Turner here to-day. We met for the first time in the dark days of war in 1943, since when I have been privileged to have his friendship. Sir James, may I assure you how grateful we of the Royal College and of the profession in general are to you and your great organisation for the constructive support which has always been forthcoming on problems of animal health and productivity?

"You, Mr. Minister, have referred to my visit to the British West Indies and to British Guiana and Venezuela under the auspices of the British Council. I was most impressed with the prestige enjoyed by the Royal College and by the magnificent efforts made by individual veterinary surgeons, past and present, often in the face of great difficulties of administration, of staffing, facilities or equipment, in effecting full control of the major disease hazards of the stock of the territories for which they were responsible. I studied, too, with great interest, their contribution to the build-up of the livestock industry which is in such demand and so sorely needed in these Commonwealth countries where there is a predominantly young and rapidly increasing population seeking and requiring a higher standard of living.

"This Royal College maintains a Commonwealth Register and has members working in all parts of the world in the profession of their choice. It is my view that in the future we should aspire to be, in fact, the Royal College of Veterinary Surgeons of the Commonwealth, and in that way make our fuller contribution to that service to animal and human health to which you, my Lord Privy Seal, have so generously alluded.

"We are not unmindful of the needs of the future, of the shortage of highly trained teachers and research workers, of the growing need for specialised services at present not readily available, of the integration of animal health and economic production and of the greater demands in consequence on veterinary science.

"We have planned to try and meet these requirements by forming the Royal College of Veterinary Surgeons' Trust, and hope that through the Trust we shall provide post-graduate scholarships and bursarships in the future which will overcome the post-graduate educational problems of to-day. We are investing in this and really helping ourselves by committing the bulk of our financial resources to that Trust, with the object of rebuilding our present Royal College, which is to be demolished as part of a major road scheme, and to provide from the income of that building the post-graduate scholarships which are so necessary.

"We are hopeful that the formation of this Trust will stimulate the interest and support of those many friends of the profession in industry and commerce, in particular, who have reason to be grateful for the achievements of veterinary science in the past, more particularly those achievements in which members of the Royal College of Veterinary Surgeons played a part, and who have a vested interest in the progress of the profession of the present and the future."

Tributes to the V.V.B.F. Ladies' Guild

The Treasurer, Mr. H. Sumner, in proposing the toast of "The Guests," paid tribute to the work of the Ladies' Guild of the Victoria Veterinary Benevolent Fund.

"These ladies," he said, "do make a material contribution to the Benevolent Fund. Their reward must be the knowledge that by their efforts they have materially added to the comforts and the happiness of those members who have fallen on bad times. It is a great and noble work. It would possibly be invidious to mention names, but there are two ladies whose names have been a constant factor in this work—Mrs. Glover and Mrs. Ritchie. (*Applause.*)

"Another guest who is present with us to-day is our own Chaplain, Canon Creswell, who, after an illness, has returned to duty and has given great joy and happiness to us all. It is true that his tenure of office as Chaplain has been short, but it has been sufficiently long for him to make for himself firmly in our hearts an appreciation of his goodness."

In the course of his reply Sir James Turner, President of the National Farmers' Union, said: "I should like to pay a tribute to the Royal College for maintaining the highest possible standards of scientific attainment and application. It is a tremendous achievement to maintain such standards not only in this country but throughout the world. The progress that has been made in veterinary science is little short of a miracle.

"I am proud of the relationship between industry and the profession; and the fact that I was present at Mr. Gould's inaugural dinner as President of the British Veterinary Association and again on this occasion gives me great personal pleasure, because the good work and the good relationships between the profession and the industry have gone on from strength to strength over the years. The attainments are revealed in such things as the early prospect of complete attestation in this country. Whoever dared to imagine that twenty years ago? It is due to the diligence of the Government, the profession and the industry that we have the prospect of attaining that as early in this country as 1961."

There followed the presentation to Sir Philip Morris, Vice-Chancellor of Bristol University, of the Diploma of Honorary Associate of the Royal College. In bestowing this, the highest honour the Council has within its gift, the President paid tribute to Sir Philip's great contribution to the Veterinary School which was by now so successfully established within the University.

After luncheon the Annual General Meeting of the Royal College was held at Red Lion Square. A short account of the meeting will be published next week.

The Victoria Veterinary Benevolent Fund

A meeting of the Council of the Victoria Veterinary Benevolent Fund was held at No. 10, Red Lion Square, London, W.C.1, on Friday, April 18th, 1958, when the following members were present:—

Major J. J. Dunlop, Messrs. E. Clark, R. C. U. Fisher, Mrs. D. I. Glover, Dr. R. E. Glover, Professor J. McCunn, Mr. W. J. B. Robson, Miss V. Tillemont-Thomason, Captain W. Watt, and Major W. H. Wortley.

Mr. C. W. Francis, secretary, was in attendance.

Chairman

The President being indisposed, Professor J. McCunn was appointed to the chair.

Welcome to New Member

The Chairman, on behalf of the Council, extended a warm welcome to Mr. W. J. B. Robson, J.P., M.R.C.V.S., representative of the North of Scotland Division, British Veterinary Association.

Minutes

The Minutes of the previous meeting held on January 10th, 1958, having been published in THE VETERINARY RECORD, were taken as read and signed as correct.

Arising out of the Minutes, the Chairman informed the meeting that in accordance with their instructions, the secretary wrote to Mr. R. V. Thatcher for his views as to whether it was *ultra vires* the powers of the Council to make grants to necessitous cases for educational purposes, to which Mr. Thatcher replied on January 20th as follows:—

> "I thank you for your letter of the 15th instant, and note contents. Clause 3 (4) of the Memorandum of Association sets out the class of persons to whom the Council may properly give gratuitous relief. Incidentally the late Mr. Justice Hawkins in his judgment in the case of Cowen *v.* Kingston-upon-Hull defined the word 'necessitous' not necessarily meaning persons in extreme poverty.
>
> "I cannot find any reference in the Memorandum of Association as to the uses to which a grant made by the Council are to be restricted, and therefore I am of opinion that once the Council after consideration of each individual case have decided that an applicant is a necessitous person they can attach such conditions to a grant as they deem advisable.
>
> "On these grounds I should advise the Council that a grant to a necessitous applicant for the education of her or his child or children would be *intra vires* the powers of the Council.
>
> Yours faithfully,
> (signed) R. V. THATCHER."

Apologies for Absence

The secretary reported the receipt of apologies for absence from Messrs. G. Atkinson, E. P. Barrett, G. N. Gould, J. M. Ingram, Mrs. K. G. R. Kelly, Mr. A. A. Lamont, Professor R. Lovell, Mr. D. H. L. Madden, Professor W. M. Mitchell, Mr. G. M. G. Oliver, Professor L. P. Pugh, Mr. J. N. Ritchie, Professor W. L. Weipers, and Captain A. Whicher.

Annual General Meeting

It was resolved that the secretary be instructed to include on the Agenda of the next Annual General Meeting to be held on Wednesday, June 11th, 1958, the following:—

To consider and, if thought fit, pass the following resolution which will be proposed as a SPECIAL RESOLUTION of the Association:—

"That the Articles of Association of the Association be altered as follows:—

Article 12. Substitute the words 'months of May or' for the words 'month of' in line 2, and delete the words 'on the day on which the Annual General Meeting of the Royal College of Veterinary Surgeons is held' in lines 3 and 4."

Correspondence

The following correspondence was submitted:—

(a) Letter from Messrs. Sprott, Stokes, and Turnbull, Shrewsbury, dated February 27th, 1958, informing the Council that following the death of his widow on January 16th, 1958, a legacy of £250 from the Estate of the late Mr. J. R. Carless now became payable and would be forwarded to the Fund in the near future.

(b) A letter dated February 25th, 1958, from Mr. J. A. Flynn, M.R.C.V.S., hon. treasurer of the Veterinary Medical Association of Ireland, enclosing a subscription of £325 15s. 3d. for the Fund.

It was resolved that the secretary be requested to write to Mr. J. A. Flynn, expressing the Members' grateful thanks for this handsome contribution and their deep appreciation of the excellent financial support which the Fund now receives from the Veterinary Medical Association of Ireland.

Hunting Trust

The secretary reported for the information of Council that the surplus in the Hunting Trust as at December 31st, 1957, amounted to £982 5s. 7d., and that in accordance with the terms of the Trust, this sum was transferred by the Trustees to the Victoria Veterinary Benevolent Fund on March 10th last.

Investments

A report was submitted on behalf of the hon. treasurer to the following effect:—

(a) That the sum of £982 5s. 7d. which had been transferred to the General Fund from the Hunting Trust had, by the unanimous decision of the Executive Committee, been invested in the purchase of £1,174 7s. 8d. British Electricity Stock 4 per cent., 1974/9.

(b) That on February 24th last, the Executive Committee had accepted an Offer of Conversion into Commonwealth of Australia 6 per cent. Registered Stock, 1974/6, of our present holding of £200 3 per cent. Registered Stock, 1955/8.

It was resolved that the action of the Executive Committee be confirmed.

Accountant's Report

The secretary read the following report which was approved, a vote of thanks being accorded to the respective donors:—

Since the previous meeting, the following special subscriptions and donations have been received:—

	£ s. d.	£ s. d.
Subscriptions		
Eastern Counties Veterinary Association	15 15 0	
Veterinary Medical Association, Ireland	325 15 3	
Western Counties Veterinary Association	5 5 0	
Yorkshire Veterinary Society	5 5 0	
		352 0 3
Donations		
COLLECTING BOXES		
Ayrshire Veterinary Association	1 5 0	
Central Veterinary Society	6 10 9	
Scottish Branch, Association of Veterinary Teachers and Research Workers	4 0 0	
South Eastern Veterinary Association	9 0 0	
Scottish Metropolitan Division	3 1 6	
Veterinary Investigation Officers' Annual Conference	6 12 6	
Welsh Branch, B.V.A.	1 2 6	
Western Counties Veterinary Association	8 16 6	
		40 8 9
"In Memory of Professor G. H. Wooldridge" (Total now £120 18s.)	2 2 0	
Cagiernard, B.	10 0	
Crufts Dog Show	13 2 6	
Ladies' Kennel Association	10 10 0	
North of England V.M.A. Dinner-Dance	35 12 0	
Scottish Sub-section of Veterinary Officers' Section of Institute of Professional Civil Servants	2 15 0	
Wellingborough and District Canine Society	2 2 0	
		66 13 6
		£459 2 6

Cases

No. 304. M.R.C.V.S., aged 59. Ill-health. The Executive Committee reported that as a result of a report received from a local member on this case, they had made a provisional grant of £2 per week. commencing from March 1st. After the Council had heard this report, the action of the Executive Committee was approved and the grant extended to the end of September, when the case be further considered.

No. 307. Widow. One child, aged 11½ years. Husband died recently. A member of Council, who was interested in this case reported that the widow, a nurse, had arranged to take up an appointment on March 1st, but was prevented from so doing as she herself had to be admitted to hospital for an operation. She had now been discharged, but has to rest for several weeks. It was agreed that a special grant of £5 per week for the month of April be made in this case.

No. 321. Member, aged 87. Unable to practise and is disposing of his few remaining investments to cover living expenses. Fund giving a grant of £2 per week. A report on his recent visit to this member having been submitted by a member of Council, *it was resolved* that the grant be increased to £3 per week as from April 1st.

No. 325. Widow, aged 53. Three sons, ages 19, 26, and 30. Application for grant towards younger son's education. The Secretary informed the meeting that a report has not yet been received in this case. The consideration of this applicant was therefore deferred.

No. 326. M.R.C.V.S. Three children, ages 7 and 4 years and 8 months. Applicant and two younger children in hospital with tuberculosis. A member of Council having reported verbally on this case, *it was resolved* that a special gift of £20 be sent to his wife.

No. 327. Widow, aged 34. Seven children between the ages of 9 years and 3 months. The secretary read two reports on this case received since the last meeting. In the circumstances, the meeting agreed that as from April 1st, the grant be reduced to £2 per week and that it be reviewed in three months' time.

The Following Cases were Submitted for Review

No. 52. Widow, aged 79. Suffers from Arthritis. Has one married daughter. No income. *It was resolved* that the grant be increased to £2 10s. per week and that this recipient be visited by a member of the Ladies' Guild.

No. 132. M.R.C.V.S., aged 60. Has been very ill and unable to do any work for nearly 5 years. Three children, all married, and unable to help. *It was resolved* that the grant of £2 per week be continued, and that the hon. secretary's offer to visit this case be accepted.

Nos. 245, 264, 285, 288, 289, 299, and 302. *It was resolved* that the present grants in these cases be continued (see below for details).

No. 245. Widow, aged 73. Underwent a serious operation a few years ago. Receiving £2 10s. per week.

No. 264. Daughter of late member. Aged 68. Suffers from Auricular Fibrillation. Receiving National Assistance Board allowance, and grant from the Fund of £1 per week.

No. 285. Widow, aged 84 Two sons and four daughters. Youngest daughter Tubercular. Income £69 3s. per annum. Children giving help in kind, etc. Grant from Fund 30s. per week.

No. 288. Widow, aged 77. Permanent income of £154 per annum plus a temporary grant of £50 per annum for two years. Grant from Fund £1 per week.

No. 289. Widow, aged 83. Invalid. Three sons and 3 daughters. Two daughters looking after mother and home. Grant from Fund of 18s. per week as this recipient is also being assisted by the National Assistance Board.

No. 299. Widow, aged 62. In receipt of National Insurance Pension and small allowance from brother. Grant of £3 per week for twelve months.

No. 302. Widow, aged 64. In poor health. One son, married. Receiving assistance from N.A.B. Our grant 9s. 6d. per week.

Annual Report and Statement of Accounts

The draft Annual Report, which had been circulated was, subject to a few amendments, approved for issue to the members prior to the Annual General Meeting to be held on June 11th, 1958.

Wortley Axe Bequest

The Acting Chairman of the Wortley Axe Sub-Committee reported that owing to the President's absence and the inability of two other members to be present, the Sub-Committee at its meeting held earlier to-day decided that the consideration of Counsel's Opinion on the terms of the Wortley Axe Bequest (which was only received by the Members

(Continued on page 513)

XUM

News and Comment

NEW OFFICERS OF THE R.C.V.S.

At a special meeting of Council, held on Thursday, June 12th, 1958, the following elections were made:—

President, Professor T. J. Bosworth, M.A., B.SC., M.R.C.V.S., D.V.S.M.; *Senior Vice-President*, Mr. G. N. Gould, J.P., M.R.C.V.S.; *Junior Vice-President*, Mr. J. N. Ritchie, C.B., B.SC., F.R.C.V.S., D.V.S.M., F.R.S.E., and *Treasurer*, Mr. H. Sumner, F.R.C.V.S., D.V.H.

A TRIBUTE TO DR. R. F. MONTGOMERIE

A cocktail party took place at the Wellcome Research Laboratories at Beckenham on Thursday evening, June 12th, when the Director of Research, Dr. D. W. Adamson, and a number of his senior colleagues in the Wellcome Foundation met to congratulate Dr. Montgomerie on the completion of 21 years' service.

Dr. Montgomerie succeeded Sir Thomas Dalling as Director of Veterinary Research in 1937. He made a notable contribution to the veterinary activities of the Laboratory through the difficult war years, and has been prominent in the advancement of the veterinary interests of the Wellcome Foundation from 1945 onwards.

In congratulating Dr. Montgomerie on his long period of service, the Director of Research expressed the pleasure of the Directors of the Foundation that, despite a heavy burden of responsibility within that organisation, Dr. Montgomerie had made time to serve his profession with so much distinction.

MYCOTIC DERMATITIS

It has been noted by the Ministry of Agriculture that since Nisbet and Bannatyne and Kane, Downing and Wilsdon reported mycotic dermatitis in sheep in 1955, the disease has not been seen again in epizootic form. Recent examination of sheep in several areas of the country, however, has indicated that the disease may be on the increase and a short note in the farming press has advised owners who suspect the condition at shearing time this year to contact their veterinary surgeons so that the condition may be diagnosed.

Assessment of the prevalence and economic importance of mycotic dermatitis in this country depends on the number of cases reported and it would therefore be of great help if veterinary surgeons could send material from suspected outbreaks to their area Veterinary Investigation Officers.

THE BIRTHDAY HONOURS

The names of the following veterinary surgeons, and others associated with the profession, appeared in the Queen's Birthday Honours List, as published on June 12th:—Mr. H. R. Binns, O.B.E., director of the East African veterinary research organisations was created C.M.G. Major A. V. Franklin, divisional veterinary officer, Ministry of Agriculture, and Mr. R. A. Wright, chief veterinary officer Singapore, were both awarded the O.B.E. Mr. P. Bannister was awarded the M.B.E.

Professor C. H. Waddington, honorary director of the Agricultural Research Council Unit of Animal Genetics, received the C.B.E., and Mr. A. Ramsay, editor of the *Farmer and Stock-breeder*, received the O.B.E.

UNIVERSITY NEWS

Edinburgh

The undermentioned candidates have passed the Part I Examination for the Diploma in Tropical Veterinary Medicine:—

Fry, Norman Charles Vincent, M.R.C.V.S.; Mehanni, Saad, DIP.VET.SC. (Khartoum); Nixon, Raymond Charles, B.V.SC. (Pretoria); Shaib, Bukar, M.R.C.V.S., and Thuraisingham, Sinnatamby, M.R.C.V.S.

The undernoted candidates have passed the Examinations for the Diploma in Veterinary State Medicine:—

Davies, David Charles, M.R.C.V.S.; Osborne, Alfred Dudley, M.R.C.V.S.

SWINE FEVER

In view of the number of outbreaks of swine fever in certain counties in England, an Order has been made under The Swine Fever (Infected Areas Restrictions) Order, 1956, declaring two areas to be infected with swine fever. The first area comprises the counties of Cheshire, Leicestershire, Staffordshire, Warwickshire, Worcestershire and most of the county of Shropshire, and the second area comprises the county of Dorset and most of the county of Somerset.

The restrictions came into operation on Friday, June 13th.

THE PIG INDUSTRY DEVELOPMENT AUTHORITY

Seven members of the profession are to form the first veterinary advisory committee appointed by the Authority.

Professor A. Robertson, Director of the Royal (Dick) School of Veterinary Studies, will act as chairman, and the other members of the committee who have been chosen after consultation with the R.C.V.S., the B.V.A., the Ministry of Agriculture, and the Department of Agriculture for Scotland will be:—Professor L. P. Pugh, Dr. N. Barron, Mr. J. T. Done, Mr. H. I. Field, Dr. D. Luke, and Mr. D. F. Oliver, honorary secretary of the B.V.A.

The Ministry of Agriculture, has agreed to allow Mr. D. R. Melrose, B.SC., M.R.C.V.S. to assist the P.I.D.A. to form an appreciation of the outstanding problems on artificial insemination for pigs and to

report on current experience of the use of A.I. in the field.

Mr. Melrose has recently returned from a tour of Denmark, Sweden and Norway where he studied artificial insemination for pigs in those countries.

PERSONAL

Birth

GLAS.—On June 14th, 1958, to Margot, wife of G. Michael Glas, M.R.C.V.S., of 5, Brensham Road, Tewkesbury, Gloucestershire, a son, brother for Caroline, Carmen.

Silver Wedding

GEFFEN—MADGE-FORMAN.—On June 17th, 1933, Leonard R. Geffen, M.R.C.V.S. 1941, to Maude Eileen Madge-Forman.

Mr. H. Sumner. In referring to the conferment on Mr. Sumner of the honorary degree of M.V.Sc. by the University of Liverpool it was mistakenly stated that he had been a member of the teaching staff in the Faculty of Veterinary Science. The information was taken from the official notice in *The Times*. It was Mr. Sumner's father who taught at one time in the School, and we regret the error published in our columns.

THE HAMPSHIRE CATTLE BREEDERS' SOCIETY

In their Annual Report for 1957 the Committee of Management record that the past year was marked by considerable progress in the affairs of the Society. The building of the new A.I. Centre at Lyndhurst continued throughout 1957, and by the end of the year was nearly completed.

An increase in the number of first inseminations, both in cattle and in pigs, again took place: 6,416 first inseminations using deep-frozen semen were carried out of which 4,622 were from the Society's bulls at a conception rate of 62 per cent. (55 per cent. in 1956), while 53,160 first inseminations with fresh semen gave a conception rate of 67 per cent. Fresh and frozen semen purchased from other A.I. Centres gave conception rates of 65.4 and 53 per cent. respectively. Milk diluent was used for the greater part of the year and gave results equally as good as the egg-yolk citrate diluent—the overall conception rate remaining the same as for 1956 at 66.4 per cent.

A noticeable feature was the increased demand for beef inseminations which formed one-fifth of the total. Aberdeen Angus inseminations increased by 67 per cent. and Hereford by 56 per cent. Actual numbers of Shorthorn and Friesian inseminations fell while Guernsey, Jersey, and Ayrshire numbers rose.

The second year of the experimental pig service was noted for a continued improvement in the conception rate. There are now indications that sufficiently good results will be obtained to make A.I. a sound commercial proposition for the small pig farmer. The improved technique, using Norwegian insemination pipettes, effected a definite improvement, but the best results have been obtained in those herds where the sow has been offered for insemination at the optimum stage of oestrus. While further research and the introduction of new techniques will undoubtedly improve conception, the detection and presentation of the sow or gilt at the right time will inevitably be of overriding importance. Better results have so far been obtained for sows than for gilts, the farrowing rate on first inseminations in each case being 50 and 37 per cent. for the year.

The Committee of Management hope that the improved facilities and accommodation now available in the new headquarters buildings will provide their members with an unrivalled A.I. service.

THE INTERNATIONAL ASSOCIATION OF VETERINARY FOOD HYGIENISTS

We are advised that this Association will meet during the International Veterinary Congress which takes place in Madrid from May 21st to 27th, 1959. As time for individual subjects will be limited it has been decided to arrange a separate symposium for the Association, possibly in Switzerland, in the autumn of 1959.

So far as the International Congress is concerned, four main subjects concerned with food hygiene will be dealt with, and in addition there will be time allotted for ten minute communications on other suitable subjects. Members of the profession who would like to deliver such brief communications are asked to write, giving suggested titles, to Mr. Horace Thornton, Veterinary Department, Town Hall, Newcastle upon Tyne. Letters should reach him by or before September 1st, 1958.

COMING EVENTS

June

25th (Wed.). Summer Meeting of the Herts and Beds Veterinary Society.

Annual General Meeting of the North of Scotland Division in the Northern Hotel, Aberdeen, 2.30 p.m.

Summer Meeting of the Mid-West Veterinary Association at the Royal York Hotel, Bath, 2.30 p.m.

26th (Thurs.). Summer Meeting of the Sussex Veterinary Society at the Cattle Market, Haywards Heath, 2.30 p.m.

Meeting of the Lakeland Veterinary Association at the Hydro, Windermere, 6.30 p.m.

Annual General Meeting of the Ayrshire Veterinary Association in the Station Hotel, Ayr, 2.30 p.m.

July

18th (Fri.). Summer Meeting of the Yorkshire Veterinary Society in the Royal Station Hotel, York, 2.30 p.m.

September

21st to 26th (Official Opening, Monday, September 22nd). 76th Annual Congress of the British Veterinary Association in Douglas, Isle of Man.

XUM

BRITISH VETERINARY ASSOCIATION QUARTERLY MEETINGS IN LONDON

Wednesday, July 9th—No. 7, Mansfield Street

10.00 a.m. Veterinary State Medicine Committee.
11.30 a.m. Parliamentary and Public Relations Committee.
2.00 p.m. Finance Sub-committee.
3.45 p.m. Home Appointments Committee.

Thursday, July 10th—No. 7, Mansfield Street

9.30 a.m. Small-Animals Committee.
11.30 a.m. Farm Livestock Committee.
2.15 p.m. General Purposes and Finance Committee.

Friday, July 11th—Connaught Rooms, Gt. Queen Street, W.C.2

10.15 a.m. Council.

R.C.V.S. EXAMINATIONS

Wednesday, June 25th, and Thursday, June 26th. M.R.C.V.S. Written Examinations.

Friday, June 27th. M.R.C.V.S. Practical and Oral. Examinations commence (Panel " B ").

Monday, June 30th. M.R.C.V.S. Practical and Oral Examinations commence (Panel " A ").

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Northants. Wharf Road Meadow; Higham Ferrers, Wellingborough (June 12).
Wilts. Roughleaze Farm, Calne (June 10).
Yorks. Hammersgill Farm, Ellingstring, Masham, Ripon (June 9).

Fowl Pest

Cambs. 1, Council Houses, Little Thetford, Ely (June 8).
Glos. Loves Holding, Market Lane, Cirencester (June 11).
Herts. 31, Garden Walk, Royston (June 11).
Kent. Whitehall Farm, Capel-le-Ferne, Folkestone; Peacehaven, Dunn Street, Bredhurst, Gillingham (June 12).
Suffolk. 1, Council Houses, Crowfield, Ipswich (June 10).
Sussex. 1, Denmans Cottages, Fontwell, Arundel; 6, Elm Cottages, Nyton Road, Aldingbourne, Chichester; 6, Barnett Cottages, Aldingbourne, Chicheser; Durrington Orchard Nursery, Durrington, Worthing (June 6); 9, Seaton Road, Littlehampton (June 10).

Swine Fever

Anglesey. Llwydiarth Fawr, Llanerchymedd (June 10).
Berks. Woolton Hill, Newbury (June 12).
Bucks. The Old Rookery, Beech Tree Road, Holmer Green, High Wycombe; 19, Jubilee Road, Stokenchurch, High Wycombe (June 10).
Cambs. St. Johns Road, Ely (June 6).
Ches. Moor Hall, Aston, Nantwich (June 6); Bridge inn, Dudlem, Crewe (June 10).
Denbighs. Bryn Howell Farm, Trevor, Wrexham (June 11).
Derbys. Smithy House, Spanton, Ashbourne (June 9).
Dorset. Afflington Manor Farm, Corfe Castle, Wareham; Bleve Farm, Broadmayne, Dorchester (June 9).
Essex. Manor Farm, Great Holland, Frinton-on-Sea; Heath Cottage, Langham Road, Boxted, Colchester (June 9).
Hunts. Bencroft Lane, Warboys (June 6); Fenton Field Farm, Bencroft Lane, Warboys (June 9).
Lancs. 2, Elizabeth Street, Heywood; Shipperbottom Farm, Walmersley, Bury (June 10); Standlees Farm, Ashworth Road, Heywood (June 12).
Leics. No. 5 Holding, L.S.A., Elmesthorpe (June 6); Redhall Farm, Barwell; 21 Holding, L.S.A., Elmesthorpe (June 9).
Norfolk. Greenacres, Needham, Harleston; The Street, Coltishall, Norwich (June 9).
Oxford. Woodleys Farm, Woodstock (June 9); The Stables, Chapel Lane, Bodicote, Banbury (June 12).
Shrops. Belton Farm, Whitchurch (June 10); No. 2, Littlewood, Totterton, Lydbury North; Windley Farm, Crudgington, Wellington (June 11); Greenacres, Fenemere Lane, Baschurch, Shrewsbury (June 12).
Somerset. Higher Easthams Farm, Crewkerne (June 9).
Staffs. Church Farm, Armitage, Rugeley; Whitehouse Farm, Normans Heath, Tamworth (June 6); Dunstall Allotments, Gorsebrook Road, Wolverhampton; 48, Florence Street, Walsall (June 9); Leasowes Farm, Stretton (June 10).
Suffolk. Bildeston Road, Ringshall, Stowmarket (June 9); 1, Coastguard Cottages, Dunwich, Saxmundham; Coppins Farm, Bacton, Stowmarket (June 10).
Sussex. North View Farm, Chalvington, Hailsham; Stunts Green Farm, Hurstmonceux, Hailsham (June 9)
Warwicks. 127, Elmdon Lane, Marston Green, Birmingham (June 12).
Worcs. Syntley Farm, Astley, Stourport (June 10).
Yorks. Rooley Cottage Farm, Rooley Lane, Bradford (June 10).

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

SCIENTIFIC

Soluble Lactates and their Probable Value in Ruminant Ketosis

Sir,—The value of lactates, administered orally, in bovine ketosis has been demonstrated in several investigations. Seekles (1951) reported that ammonium lactate, in 4-oz. doses twice daily, had given beneficial results in numerous cases to which it had been given routinely. Shaw, Chung, Gessert and Bajwa (1955) obtained excellent responses from calcium lactate. The latter workers found that a mixture of calcium lactate and sodium lactate was more palatable than calcium lactate, which in turn was more palatable than ammonium lactate. They concluded that calcium lactate, alone or in combination with other forms of lactate, offered considerable promise, either as the sole treatment for ketosis or as an adjunct to the injection of glucocorticoids or of ACTH.

In a later study, Hueter, Shaw, and Doetsch (1956) found considerable difference between sodium and calcium lactates. Whereas both caused appreciable increases in rumen propionic acid, only sodium lactate led to marked increases in blood lactic acid and blood glucose levels. It was suggested that the increase in blood glucose was due primarily to absorption of lactic acid from the more soluble lactate, and not to the absorption of propionic acid.

Although calcium lactate led to sustained increases in rumen butyric acid levels, these were not reflected by increases in blood glucose. Hueter *et al.* concluded that since good results had already been obtained by administering calcium lactate *per os* in bovine ketosis, the more soluble forms of lactate should prove more effective for the purpose.

The preparation of lactates employed pharmaceutically in a high degree of purity is not technically easy, and the limits imposed by official monographs have not always been stringent. In repeating and extending some of the observations of Hueter *et al.* we were fortunate in being supplied with lactates having low limits of impurities. Calcium sodium lactate was among those chosen on account of its better solubility in water than calcium lactate, and of the reports, from its use in human medicine, of good absorption, freedom from nauseating taste, and lack of irritant action upon the alimentary mucosa. It was felt also that while sodium lactate would be suitable for incorporation in liquid preparations, the calcium sodium lactate, if active, could be fed in various ways or administered in powder form.

Intact yearling female goats, weighing 25 to 40 kg., were fasted for varying periods prior to dosing at rates equivalent to from 1 to 3 g. lactic acid per kg. bodyweight. As in the case of the fistulated cows studied by Hueter *et al.*, these goats showed significant increases in blood lactic acid and glucose levels from sodium, but not from calcium, lactate. Calcium sodium lactate was active also, single doses of 1 g. per kg. bodyweight producing an elevation of blood sugar from the overnight fasting level of 50 to 55 mg. to between 70 and 80 mg. per 100 ml. within 2 to 3 hours of dosing. Similar prompt rises to this level were produced by dosing animals that had been fasted for 7 to 8 days, by which time the blood sugar levels had fallen to approximately 40 mg. per 100 ml. All 4 female goats subjected to this long fast recovered rapidly following dosage with 1 g. per kg. bodyweight calcium sodium lactate, and a return to normal rations.

The rises in blood glucose were preceded by rises in blood lactic acid. With due allowance for variations associated with excitement or handling, these rises were of the order of 7 to 10 mg. above the fasting level, and indicated a probable direct absorption of soluble lactate as postulated by Hueter *et al.* Scouring was not produced in any instance in goats following administration of lactate preparations, although in some instances laxation occurred in experimental sheep.

In view of the report by Chung and Shaw of deaths in goats receiving sodium salts in addition to 9-α fluorohydrocortisone, goats were dosed with 1 g. calcium sodium lactate per kg. bodyweight per day, and, on the 4th day, given therapeutic doses of a corticosteroid preparation widely used in this country, *viz.* prednisolone (as Deltacortril, kindly supplied by Mr. R. A. Paterson of Pfizer Limited). These and subsequent injections were without any adverse effect.

Full details of this work, together with those of related studies on other substances stated to exert a beneficial effect upon ketosis in ruminants when given by mouth, will be published elsewhere. In the meantime it may be considered that calcium sodium lactate, as well as sodium lactate, is likely to prove beneficial in the treatment or adjuvant treatment of ketosis, and field trials are being instigated accordingly. The effect of the long-term feeding of lactates on rumen *p*H (Briggs, Hogan & Reid, 1957) is being studied in calves.

Yours faithfully,

ALASTAIR N. WORDEN,
T. F. REID.

Nutritional Research Unit,
Huntingdon.

May 30th, 1958.

References

BRIGGS, P. K., HOGAN, J. P., & REID, R. L. (1957). *Aust. J. agric. Res.* **8**. 674.
CHUNG, A. C., & SHAW, J. C. (1957). *J. Dairy Sci.* **40**. 105.
HUETER, F. G., SHAW, J. C., & DOETSCH, R. N. (1956). *Ibid.* **39**. 1.430.
SEEKLES, L. A. (1951). *Vet. Rec.* **65**. 494.
SHAW, J. C., CHUNG, A. C., GESSERT, R. A., & BAJWA, G. (1955). *Misc. Publ. Md agric. exp. Sta.* **238**. 15.

Rinderpest in Sheep

Sir,—I have read with enjoyment Johnson's interesting description of an outbreak of rinderpest involving cattle and sheep in Nigeria. His speculative discussion is thought provoking and invites comment.

In Europe in the 1860's the natural but fortuitous selection of a mutant genotype of rinderpest virus possessing the ability to infect sheep in contact with sick cattle triggered a bitter controversy which was only resolved in the following years by the appalling losses of both cattle and sheep. In subsequent epizootics the rôle of sheep declined. Johnson admits the possibility of a similar phenomenon occurring in Nigeria but he favours the hypothesis that stress factors had lowered the innate resistance of the sheep such that the virus invaded, multiplied, and induced a marked clinical reaction. He assumes that in the absence of stress inapparent infections occur. Perhaps so but there is no supporting evidence.

The postulated relâtionship between the dose of virus and the severity of the subsequent reaction in the host is venerable but spurious; a dose of virus just capable of infecting a susceptible host induces a response indistinguishable from the response to a vastly greater dose except that the former response is delayed. A specialised exception is the phenomenon first described by Henle and Chambers (1941), and repeatedly confirmed, that virus yields obtained in fowl embryos inoculated with high concentrations of influenza virus were lower than those obtained after the injection of diluted virus suspensions. The explanatory hypothesis of auto-interference was crystallised by von Magnus (1951). A second possible exception concerns the so-called toxic reactions associated with the introduction of massive amounts of virus into tissues in which the virus does not multiply to maturity (Henle & Henle, 1946; Schlesinger, 1950; Davenport, 1952).

The variable responses of experimentally and naturally infected sheep can be attributed to the strains of virus involved. A close analogy is the fate of strains of rinderpest virus in fowl embryos; a few propagated but most did not (Hudson, 1947). Similarly transmissibility is an hereditary characteristic and variations between strains of rinderpest virus are well known.

An increased incidence of clinical rinderpest in Nigerian sheep would support the mutation hypothesis but would imply that the mutant was selected before the infected cattle reached the laboratory. The non-occurrence of further outbreaks will not nullify the mutation hypothesis. In fact, fresh outbreaks are unlikely because the selection of a spontaneous mutant, virulent for sheep, was probably favoured by the unique massive exposure which must have increased the chances of the mutant being picked up. The subsequent prompt slaughter of the flock would remove the selected strain from the epizootiological picture. As Johnson suggests the key to the solution of the problem will be the incidence of past infection in sheep as revealed by serological surveys.

Yours faithfully,
GORDON R. SCOTT.

Bacteriology Department,
University of Edinburgh.

June 2nd, 1958.

References

DAVENPORT, F. M. (1952). *J. Immunol.* **69**. 4611.
HENLE, G., & CHAMBERS, L. A. (1941). *Proc. Soc. exp. Biol., N.Y.* **46**. 713.
———, & HENLE, W. (1946). *J. exp. Med.* **84**. 623.
HUDSON, J. R. (1947). *Vet. Rec.* **59**. 331.
JOHNSON, R. H. (1958). *Ibid.* **70**. 457.
SCHLESINGER, R. W. (1950). *Proc. Soc. exp. Biol., N.Y.* **74**. 541.
VON MAGNUS, P. (1951). *Acta Path. microbiol. Scand.* **28**. 278.

GENERAL

R.C.V.S. Council Election

Sir,—May I thank very sincerely those of the electorate who have returned me for a further period of office, with the assurance that at all times I will assist my colleagues in safeguarding and enhancing their interests. Now that the number for which a vote may be given has been reduced to 20, *i.e.* 5 per annum, it should not be difficult to assess those best fitted for this purpose, taking care that the representation does not become a lop-sided one. In reply to the points raised in these columns dated May 10th, by Mr. J. N. Simpson White:—

(a) Importation of meat from Argentina should stop until an enquiry is held into the standard of *veterinary inspection* before it is exported. I would prefer home production of all foodstuffs raised to the maximum, and importation restricted to the British Commonwealth.

(b) The absence of a properly constituted meat inspection service under *direct veterinary control*, in the United Kingdom, is a matter I have repeatedly drawn attention to in these and other columns, and on outside committees whenever the opportunity has arisen. It is farcical.

(c) The labourer should always be worthy of his hire. It cannot be claimed that members of our profession are over-paid, and their achievements in research etc. have never been adequately recognised, or rewarded.

(d) Insurance companies still expect the maximum of protection in return for a widow's mite! The fees are disgracefully low.

(e) I cannot visualise prevention or control of any disease, until measures known are made compulsory, and thereby, enforced.

(f) In all matters relating to animal health, the profession must be consulted, and well represented on committees that are set up. We are still fortunate if we can get one of our members on these; and why not a veterinary chairman now and again for a change?

Yours faithfully,
J. F. D. TUTT, F.R.C.V.S.

"Rothiemurchus,"
Winchester.

June 16th, 1958.

Sir,—May I thank those members of the profession who, by their votes, secured my re-election to the Council of our Royal College.

I shall endeavour to justify and deserve their support by regular attendance at meetings and by interpreting and representing what I believe to be the views and wishes of my colleagues, particularly those who, like myself, are in practice.

Yours faithfully,
JOAN O. JOSHUA.

78 Brentway,
Finchley, N.3.

June 15th, 1958.

Sir,—Through the courtesy of your columns I should like to thank all those members of the profession who recorded their votes for me at the recent R.C.V.S. election. I would like also to take this opportunity of congratulating the successful candidates.

Yours faithfully,
MICHAEL YOUNG.

90 Uxbridge Road,
West Ealing,
London, W.13.

June 15th, 1958.

Sir,—I should be grateful if you would afford me the opportunity of expressing my thanks to members of the profession whose votes have given me the privilege of serving on the Council of the Royal College. I should like them to feel assured that I shall always use my best endeavours towards maintaining the prestige, and forwarding the interests of our profession.

Yours faithfully,
GORDON C. KNIGHT.

Royal Veterinary College,
Camden Town,
London, N.W.1.

June 17th, 1958.